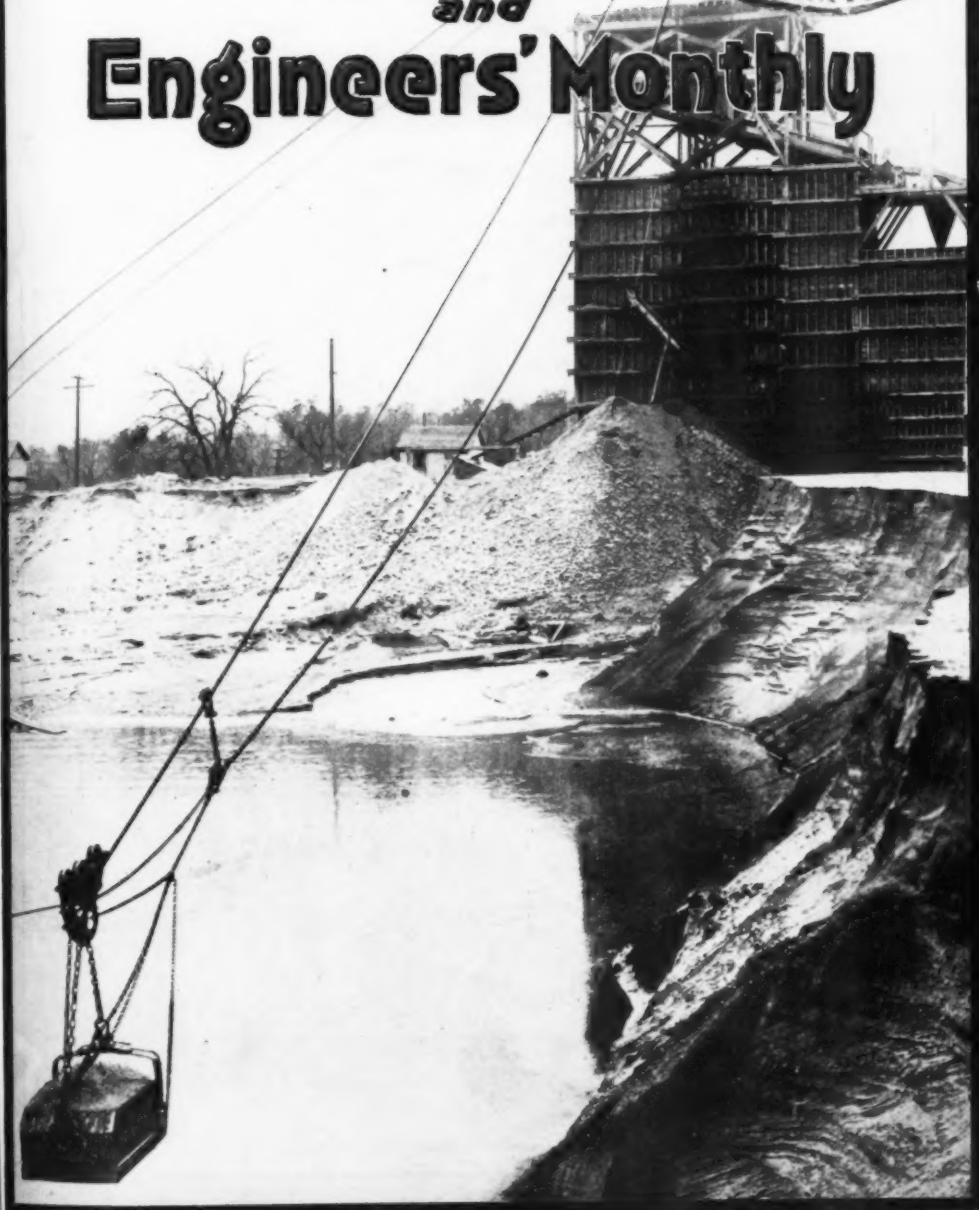


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# Contractors *and* Engineers' Monthly

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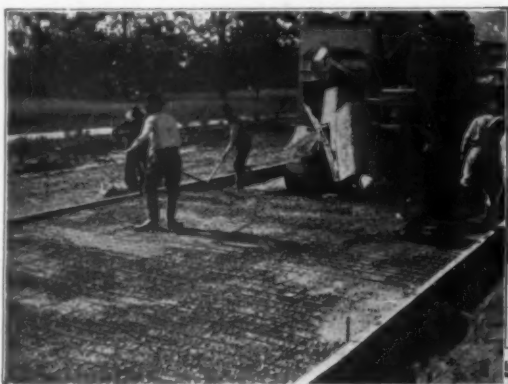


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## WIRE MESH AND CONTRACTION JOINTS

VOL. VII. No. 6

CONTRACTORS' & ENGINEERS' MONTHLY

DECEMBER, 1923

Entered as second-class matter, April 16, 1923, at the Post Office at New York, N. Y., under Act of March 3, 1879  
Issued Monthly, by The Civic Press, 443 Fourth Ave., New York

Price 25 Cents, \$1 Yearly

Printed in U. S. A.

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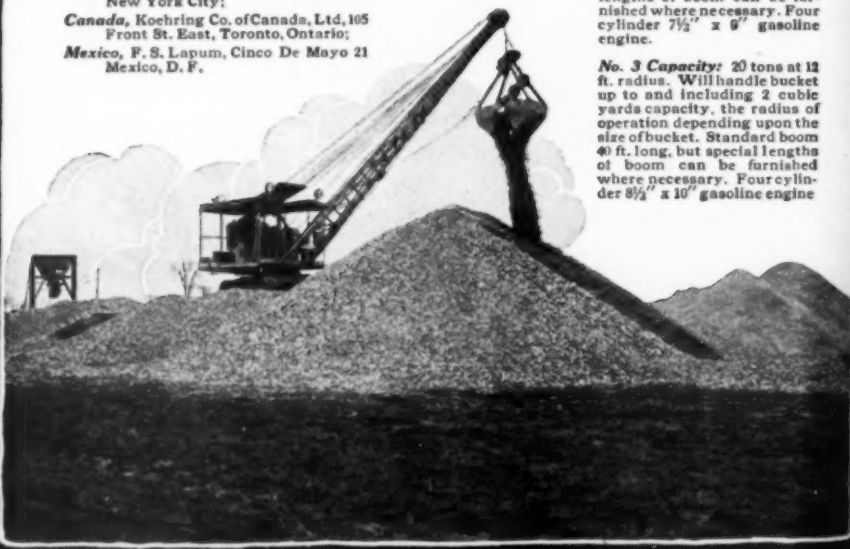


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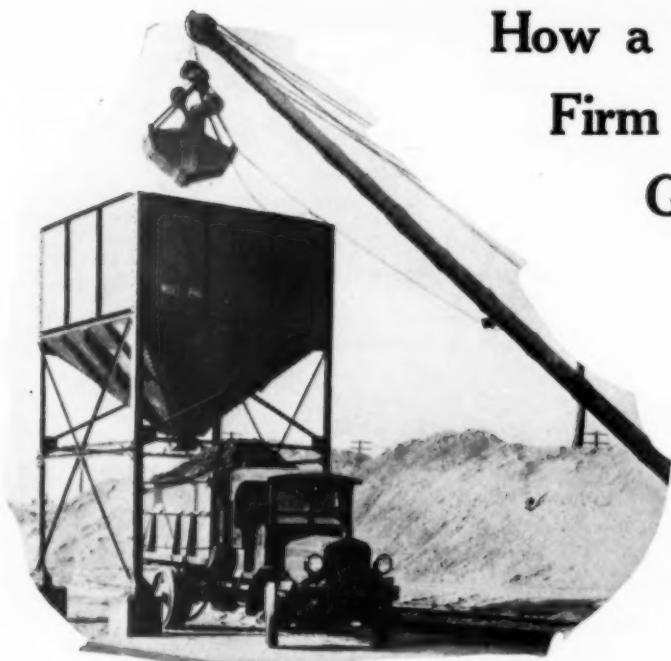
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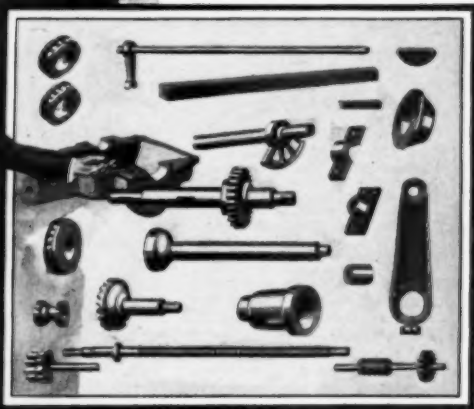
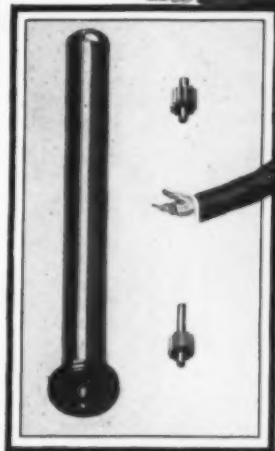
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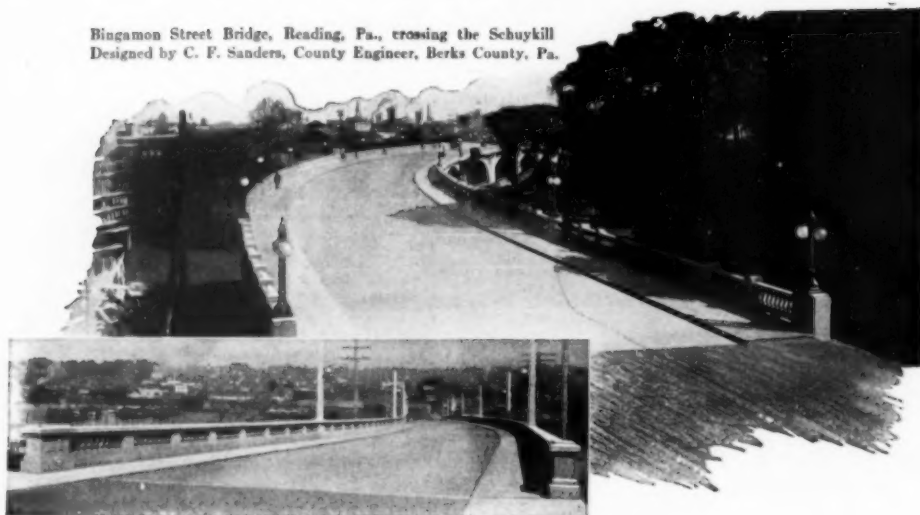
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A Standardized Preformed Paving Joint  
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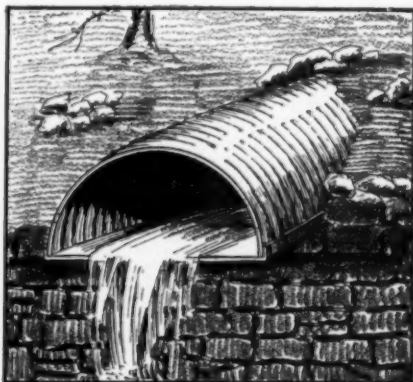
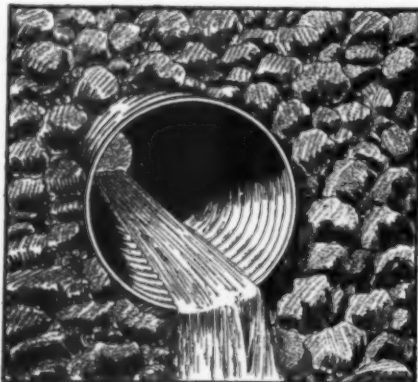
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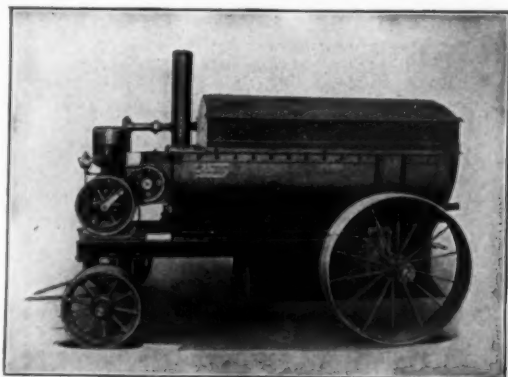


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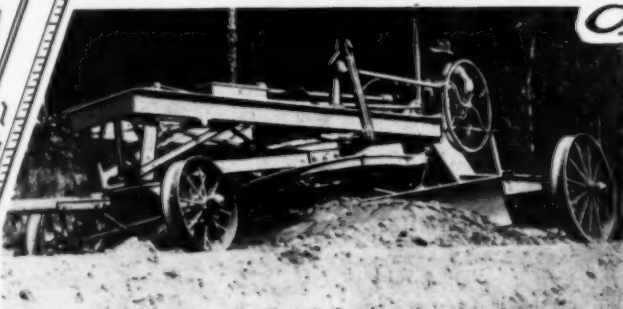
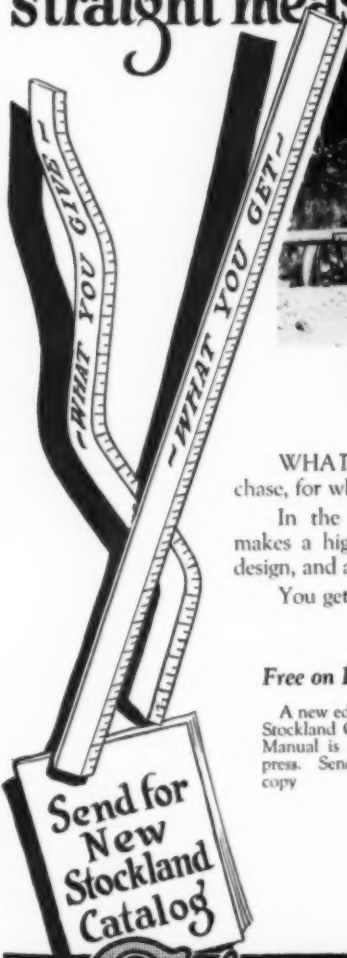
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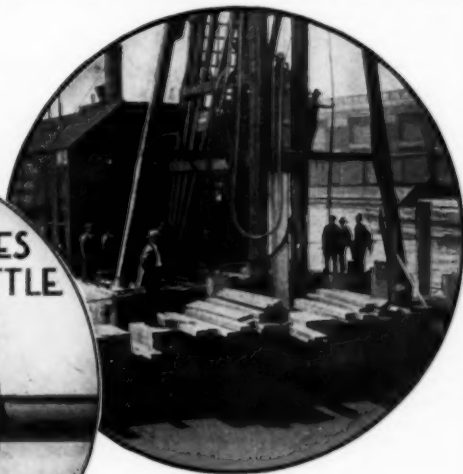
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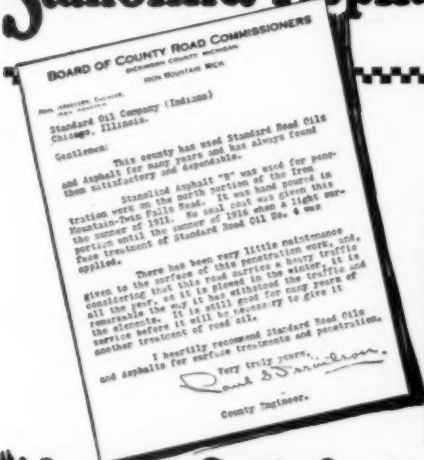
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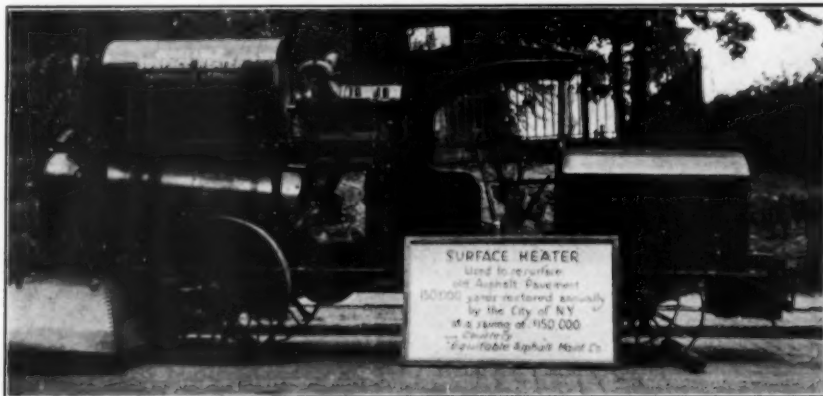
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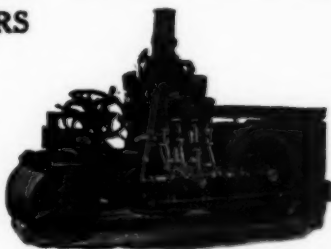
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\*Austin Machinery Corp'n, Toledo, O.  
 \*Keystone Driller Co., Beaver Falls, Pa.  
 American Steel Dredge Co., Fort Wayne, Ind.  
 Bellwood Steam Shovel Co., Bellwood, Pa.  
 Browning Co., Cleveland, O.  
 Bucyrus Co., South Milwaukee, Wis.  
 Byers Machine Co., J. F., Ravenna, Ohio.  
 Erie Steam Shovel Co., Erie, Pa.  
 Fairbanks Steam Shovel Co., Marion, O.  
 Industrial Works, Bay City, Mich.  
 Marion Steam Shovel Co., Marion, O.  
 Osgood Co., Marion, O.  
 Smith Co., T. L., Milwaukee, Wis.  
 Thew Shovel Co., Lorain, O.

## SIGNS, STREET AND ROAD

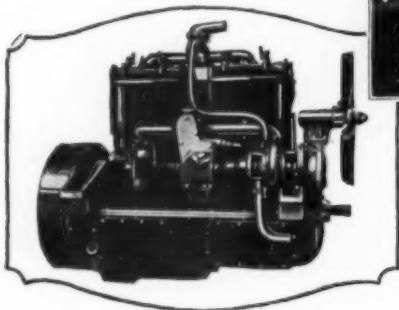
Baltimore Enamel & Novelty Co., Baltimore, Md.  
 Ingram-Richardson Mfg. Co., Beaver Falls, Pa.  
 Lyle-Signs, Minneapolis, Minn.  
 Municipal Products & Elec. Co., Buffalo, N. Y.  
 Municipal Street Sign Co., New York.  
 Nelke Sign Co., J. L., New York.  
 Safety Traffic Guide Co., Elkhart, Ind.  
 Union Iron Products Co., East Chicago, Ind.  
 Western Display & Mfg. Co., St. Paul, Minn.

## SIGNS, TRAFFIC

Automatic Signal & Sign Co., Chicago, Ill.  
 Best Traffic Light Co., E. Peoria, Ill.  
 Elkhart Fdry. & Mach. Co., Elkhart, Ind.  
 Esco Mfg. Co., Peoria, Ill.  
 Federal Signal Co., Albany, N. Y.  
 Ingram-Richardson Mfg. Co., Beaver Falls, Pa.  
 Little Giant Co., Mankato, Minn.  
 Lyle-Signs, Minneapolis, Minn.

\* Indicates that the manufacturer carries on advertisement. See index facing inside back cover.

## 10 Cents A Month Total Repair Cost in 18 months of Continual Operation



### Used as Standard Equipment by—

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Byers Machine Co., Ravenna, Ohio.  
Victor R. Browning, Cleveland, Ohio.  
Link Belt Co., Chicago, Ill.  
McMyer-Interstate Co., Cleveland, Ohio.  
Moore Speedcrane, Inc., Chicago, Ill.  
Northwest Engineering Co., Green Bay, Wis.  
Orton & Steinbrenner, Huntington, Ind., and others.



Orton & Steinbrenner  
Dragline  
Excavator  
operating on Sewer  
Contract.

Whitney Brothers, Detroit, Mich., write us:

"One of your type TU engines has been operating on an Orton & Steinbrenner dragline continually for eighteen months on sewer contract. This, as you know, is the hardest kind of work that an engine can be put to.

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You will not only avoid costly repair bills, but the even greater losses due to idle machines and interrupted operations.

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THE HERCULES  
CORPORATION  
Engine Division  
Dept. B

Evansville,  
Indiana

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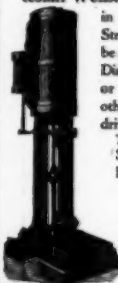
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Downie Deep Well Pumps are offered for Heavy, Continuous Service in Deep Artesian Wells. They are built in Double and Single Stroke Models and may be Steam Driven, Belted, Direct Geared to Motor, or equipped for any other standard form of drive.

Smaller Pumps for lighter service.

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Safety Traffic Lt. Co., Milwaukee, Wis.  
Thompson-Fleming, Inc., Buffalo, N. Y.  
Traffic Sign & Signal Co., Gloucester, Mass.  
Union Iron Products Co., E. Chicago, Ind.

## SLATE, ROOFING

Vendor Slate Co., Inc., Easton, Pa.

## SLATE, STRUCTURAL

Keenan Structural Slate Co., Bangor, Pa.  
Penna. Structural Slate Co., Easton, Pa.  
Phoenix Slate Co., Windgap, Pa.  
Structural Slate Co., Pen Argyl, Pa.

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Rensselaer Valve Co., Troy, N. Y.  
Smith Mfg. Co., A. P., East Orange, N. J.

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## SMOKE STACKS. (See Stacks, Steel)

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\*Baker Mfg. Co., Springfield, Ill.  
\*Good Roads Mach. Co., Kennett Square, Pa.  
\*Holt Mfg. Co., Peoria, Ill.  
\*International Motor Co., New York.  
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Barber-Greene Co., Aurora, Ill.  
Cleveland Tractor Co., Cleveland, Ohio.  
Monarch Tractors, Inc., Watertown, Wis.  
J. T. Tractor Co., Cleveland, O.  
Toy Co., W. M., Sidney, Ohio.  
Owensboro Ditcher & Grader Co., Owensboro, Ky.

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Deming Co., The, Salem, Ohio.  
Field Force Pump Co., Elmira, N. Y.  
Fitzhenry-Guptill Co., East Cambridge, Mass.

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\*Burch Flow Works Co., Crestline, O.

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Chicago Bridge & Iron Works, Chicago, Ill.  
Honkerst Co., Jos., Cincinnati, O.  
Petroleum Iron Works Co., Sharon, Pa.  
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
Scaife & Sons Co., Wm. B., Pittsburgh, Pa.  
Walsh & Weldner Boiler Co., Chattanooga, Tenn.

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Chattanooga Bldg. & Tank Co., Chattanooga, Tenn.  
Chicago Bridge & Iron Works, Chicago, Ill.  
Lancaster Iron Wks., Lancaster, Pa.  
Pacific Tank & Pipe Co., San Francisco, Cal.  
Petroleum Iron Works Co., Sharon, Pa.  
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
United Iron Works, Kansas City, Mo.  
Walsh & Weldner Boiler Co., Chattanooga, Tenn.

## STEAM SHOVELS. (See Shovels, Steam)

## STEAM TURBINES

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
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\*Connery & Co., Philadelphia, Pa.  
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\*Littleford Bros., Cincinnati, O.  
Bethlehem Steel Co., Bethlehem, Pa.  
Biggs Boiler Wks., Akron, O.  
Blaw-Knox Co., Pittsburgh, Pa.

Chatta. Boiler & Tank Co., Chattanooga, Tenn.  
Chicago Bridge & Iron Works, Chicago, Ill.  
Graver Corporation, E. Chicago, Ind.  
Holtel Steel Form & Iron Co., Warren, O.  
Hendrick Mfg. Co., Carbondale, Pa.  
Honkerst Co., Jos., Cincinnati, Ohio.  
McClintic-Marshall Co., Pittsburgh, Pa.  
Pennsylvania Bridge Co., Beaver Falls, Pa.  
Petroleum Iron Works Co., Sharon, Pa.  
Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.  
Ritter-Conley Co., Pittsburgh, Pa.  
Scaife & Sons, Wm. B., Pittsburgh, Pa.  
Toledo Crane Co., Toledo, O.  
Union Iron Works, Hoboken, N. J.  
Vulcan Iron Works, Jersey City, N. J.  
Walsh & Weldner Boiler Co., Chattanooga, Tenn.

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Babcock & Wilcox Co., New York.  
Combustion Engine Corp., New York.  
Detroit Stoker Co., Detroit, Mich.  
Laclede-Christy Clay Prod. Co., St. Louis, Mo.  
Murphy Iron Works, Detroit, Mich.  
Sanford Riley Stoker Co., Worcester, Mass.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

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## STREET CLEANERS' CARTS

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Rochester Can Co., Rochester, N. Y.  
Tarrant Mfg. Co., Saratoga Springs, N. Y.

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\*Hill Co., The, Milwaukee, Wis.  
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\*International Motor Co., New York.  
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Etnyre & Co., E. D., Oregon, Ill.  
Federal Motor Truck Co., Detroit, Mich.  
Packard Motor Car Co., Detroit, Mich.  
Pierce Arrow Motor Car Co., Buffalo, N. Y.  
Tiffin Wagon Co., Tiffin, O.  
White Co., Cleveland, O.

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Electric Railway Equipment Co., Cincinnati, O.  
General Electric Co., Schenectady, N. Y.  
King Mfg. Co., Chicago, Ill.  
Massey Concrete Products Co., Chicago, Ill.  
Mott Iron Wks., J. L., New York.  
Union Metal Mfg. Co., Canton, O.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

## STREET SIGNS. (See Signs, Street)

## STREET SWEEPERS

\*Austin-Western Road Mch. Co., Chicago, Ill.  
\*Good Roads Mach. Co., Kennett Square, Pa.  
\*Universal Road Machinery Co., Kingston, N. Y.  
Elgin Sales Corp'n, New York.  
Foamite-Childs Corp., Utica, N. Y.  
Springfield Motor Sweeper Co., Springfield, O.

## STRUCTURAL STEEL AND IRON. (See Bridges and Buildings)

## STUMP PULLERS

Bennett & Co., E. L., Westerville, O.  
Clyde Iron Works, Duluth, Minn.  
Le Plant-Choate Mfg. Co., Cedar Rapids, Ia.  
Thomas Elevator Co., Chicago, Ill.

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Babcock & Wilcox Co., New York.  
Power Specialty Co., New York.  
Superheater Co., New York.

## SURVEYORS' INSTRUMENTS. (See Instruments.)

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General Electric Co., Schenectady, N. Y.  
Wagner Elec. Mfg. Co., St. Louis, Mo.  
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Think of 300 to 600 cubic yards of dirt a day with a grading gang of only two or three men! That's all it takes on a train of three to six Baker Maney's. It's easy to handle such a gang.

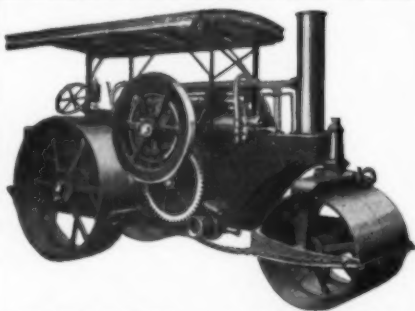
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Send for Catalog No. 95-A Let us show you how to use Baker Maney's at a big profit.

**Put a  
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Maneys  
on your  
Job**

**The BAKER MFG. CO.**

585 Stanford Ave.,  
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## **GALION ROLLERS**

### **Motor and Steam**

Furnished with or without  
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The American Cement Machine Co., Inc.

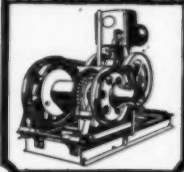
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Concrete Busher for  
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A full line of Hand  
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41

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- Construction Mack'y Co., Waterloo, Ia.
- Ingersoll-Rand Co., New York

## TANKS, AIR COMPRESSOR

- \*Connery & Co., Inc., Philadelphia, Pa.
- \*Hall Co., Milwaukee, Wis.
- \*Littleford Bros., Cincinnati, O.
- Abendroth & Root Mfg. Co., New York.
- Biggs Boiler Wks., Akron, O.
- Graver Corporation, E. Chicago, Ind.
- Indiana Air Pump Co., Indianapolis, Ind.
- Chicago Bridge & Iron Works, Chicago, Ill.
- Ingersoll-Rand Co., New York.
- Lancaster Iron Wks., Lancaster, Pa.
- National Tube Co., Pittsburgh, Pa.
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- Seafie & Sons Co., W. B., Pittsburgh, Pa.
- Westinghouse Tract. Erake Co., Wilmerding, Pa.
- Worthington Pump & Machy. Corp., New York.

## TANKS, STEEL

- \*Connery & Co., Philadelphia, Pa.
- \*Hall Co., Milwaukee, Wis.
- \*Littleford Bros., Cincinnati, O.
- Avery Co., Peoria, Ill.
- Biggs Boiler Wks., Akron, O.
- Bowser & Co., Inc., S. F., Fort Wayne, Ind.
- Case Threshing Mach. Co., J. I., Racine, Wis.
- Caldwell Co., W. E., Louisville, Ky.
- Chatta. Boiler & Tank Co., Chattanooga, Tenn.
- Chicago Bridge & Iron Works, Chicago, Ill.
- Columbian Steel Tank Co., Kansas City, Mo.
- Dover Boiler Wks., New York.
- Farrell Mfg. Co., Joliet, Ill.
- Fouts Co., C. C., Middletown, O.
- Graver Corporation, E. Chicago, Ind.
- Hardesty Mfg. Co., R., Denver, Col.
- Hendrick Mfg. Co., Carbondale, Pa.
- Honhorst Co., Jos., Cincinnati, Ohio.
- Lancaster Iron Works, Lancaster, Pa.
- Pacific Tank & Pipe Co., San Francisco, Cal.
- Petroleum Iron Works Co., Sharon, Pa.
- Pittsburgh-Des Moines Steel Co., Pittsburgh, Pa.
- Riter-Conley Co., Pittsburgh, Pa.
- Seafie & Sons, Wm. B., Oakmont, Pa.
- United Iron Works, Kansas City, Mo.
- Walsh & Weidner Boiler Co., Chattanooga, Tenn.
- Wayne Tank & Pump Co., Ft. Wayne, Ind.

## TANKS, WOOD

- Caldwell Co., W. E., Louisville, Ky.
- Davis & Son, G. M., Palatka, Fla.
- Eagle Tank Co., Chicago, Ill.
- Hausser-Stander Tank Co., Cincinnati, O.
- Kalamazoo Tank & Silo Co., Kalamazoo, Mich.
- National Tank & Pipe Co., Portland, Ore.
- Pacific Tank & Pipe Co., San Francisco, Cal.
- Redwood Manufacturers Co., San Francisco, Calif.
- Stearns Lumber Co., A. T., Boston, Mass.
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- Wendnagel & Co., Chicago, Ill.

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- Avery Co., Peoria, Ill.
- Case Threshing Mach. Co., J. I., Racine, Wis.

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- Dietsgen Co., Eugene, New York.
- Keuffel & Esser Co., Hoboken, N. J.
- Starrett, L. S., Athol, Mass.

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- Mueller Mfg. Co., H., Decatur, Ill.
- Smith Mfg. Co., A. F., E. Orange, N. J.

## TAR

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- Barrett Co., New York.

## TAR KETTLES. (See Kettles)

\* Indicates that the manufacturer carries an advertisement. See index facing inside back cover.

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- \*Koppel Ind. Car & Equip. Co., Koppel, Pa.
- Carnegie Steel Co., Pittsburgh, Pa.
- Sweet's Steel Co., Williamsport, Pa.

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- Firestone Tire & Rubber Co., Akron, O.
- Fisk Tire Co., Akron, O.
- Goodyear Tire & Rubber Co., Akron, O.
- Kelly Springfield Tire Co., New York.
- Republic Rubber Co., Youngstown, O.
- U. S. Tire Co., New York.

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## TOWERS (See Standpipe Tanks and Towers)

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- Bethlehem Steel Co., Bethlehem, Pa.
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- Easton Car & Constr. Co., New York.
- Hunt Co., Inc., C. W., West New Brighton, N. Y.
- Lakewood Engineering Co., Cleveland, O.

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- \*Holt Mfg. Co., Peoria, Ill.
- \*International Motor Co., New York.
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- Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- Avery Co., Peoria, Ill.
- Barrett-Cravens Co., Chicago, Ill.
- Bates Machine & Tractor Co., Joliet, Ill.
- Case Threshing Machine Co., J. I., Racine, Wis.
- Clark Tractor Co., Chicago, Ill.
- Cleveland Tractor Co., Cleveland, O.
- Dayton-Dowd Co., Quincy, Ill.
- Fairbanks, Morse & Co., Chicago, Ill.
- Four Wheel Drive Auto Co., Clintonville, Wis.
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- Huber Mfg. Co., Marion, O.
- International Harvester Co., Chicago, Ill.
- J. T. Tractor Co., Cleveland, O.
- Little Giant Co., Mankato, Minn.
- Moline Plow Co., Rock Island, Ill.
- Monarch Tractors, Inc., Watertown, Wis.
- Oliver Tractor Co., Knoxville, Tenn.
- Shaw-Enochs Tractor Co., Minneapolis, Minn.
- Tioga Tractor Co., Baltimore, Md.
- Twin City Co., Minneapolis, Minn.
- White Company, Taz., Cleveland, O.

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- Sewall Paint & Glass Co., Kansas City, Mo.
- Tropical Paint & Oil Co., Cleveland, Ohio.
- Truscon Laboratories, Detroit, Mich.

## TRAFFIC SIGNS. (See "Signs, Traffic")

## TRAILERS FOR TRUCKS AND TRACTORS

- Arcadia Trailer Corp., Newark, N. Y.
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- Highway Trailer Co., Edgerton, Wis.
- La Plant-Chaste Mfg. Co., Cedar Rapids, Ia.
- Lee Trailer & Body Co., Chicago, Ill.
- Troy Wagon Works, Troy, O.
- Warner Mfg. Co., Beloit, Wis.
- Watson Products Corp'n., Chasota, N. Y.
- Whitehead & Kales Co., Detroit, Mich.

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- Chase Fdry. & Mfg. Co., Columbus, O.
- Electric Wheel Co., Quincy, Ill.
- Lakewood Engineering Co., Cleveland, O.
- Lee Trailer & Body Co., Chicago, Ill.

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- Broderick & Bascom Rope Co., St. Louis, Mo.
- Leschen & Sons Rope Co., A., St. Louis, Mo.

## TRANSFORMERS

- Allis-Chalmers Mfg. Co., Milwaukee, Wis.
- Duncan Elec. Mfg. Co., Lafayette, Ind.
- General Electric Co., Schenectady, N. Y.
- Kuhlman Electric Co., Bay City, Mich.
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***"PIONEER"***



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## CLEAN YOUR WATER MAINS

One does not have to be an expert mathematician to figure out that a clogged water main calls for a stronger pressure and that in turn calls for more coal—and literally burning up money. We can show you how to get dollar for dollar value out of every ton of coal. We can show you how to clean the water mains quickly and cheaply. Send us your address—that's all we ask of you.

**National Water Main Cleaning Co.**

**Hudson Terminal Building**

**NEW YORK CITY**

## TRANSITS AND LEVELS. (See Instruments.)

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Chain Belt Co., Milwaukee, Wis.  
Dodge Mfg. Corp'n, Mishawaka, Ind.  
General Electric Co., Schenectady, N. Y.  
Link-Belt Co., Chicago, Ill.  
Webster Mfg. Co., Chicago, Ill.  
Weller Mfg. Co., Chicago, Ill.

### TRASH CANS. (See Cans)

### TREADS, SAFETY

American Abrasive Metals Co., New York.  
American Mason Safety Tread Co., Lowell, Mass.  
Concrete Steel Co., New York.  
Hendrick Mfg. Co., Carbondale, Pa.  
Norton Co., Worcester, Mass.

### TRENCH BRACES. (See Braces, Trench)

### TRENCH EXCAVATORS, (see Excavators, Ditch & Trench)

### TRENCH PUMPS. (See Pumps, Contractors')

### TURBINES

Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
De Laval Steam Turbine Co., Trenton, N. J.  
General Electric Co., Schenectady, N. Y.  
Ingersoll-Rand Co., New York.  
Midwest Engine Co., Indianapolis, Ind.  
Westinghouse Elec. & Mfg. Co., E. Pittsb'gh, Pa.

### TURNABLES FOR MOTOR TRUCKS

Blaw-Knox Co., Pittsburgh, Pa.  
Champion Eng. Co., Kenton, O.  
Freeman Mfg. Co., Racine, Wis.  
The Hug Co., Highland, Ill.  
Western Structural Co., Moline, Ill.

### USED MACHINERY

(See Contractors' Used Equipment.)

### VALVE CONTROL APPARATUS, ELECTRIC

Payne Dean, Ltd., New York.

### VALVES, CHECK

\*Ludlow Valve Mfg. Co., Troy, N. Y.  
Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Michigan Brass & Iron Co., Detroit, Mich.  
Rensselaer Valve Co., Troy, N. Y.

### VALVES, GATE AND INDICATOR POSTS

\*Ludlow Valve Mfg. Co., Troy, N. Y.  
Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Columbian Iron Wks., Chattanooga, Tenn.  
Crane Company, Chicago, Ill.  
Darling Valve & Mfg. Co., Williamsport, Pa.  
Eddy Valve Co., Waterford, N. Y.  
Fairbanks Co., The, New York.  
Iowa Valve Co., Oskaloosa, Ia.  
Kennedy Valve Mfg. Co., Elmira, N. Y.  
Lankenshelmer Co., Cincinnati, O.  
Reading Steel Casting Co., Inc., Bridgeport, Conn.  
Rensselaer Valve Co., Troy, N. Y.  
Smith Mfg. Co., A. P., East Orange, N. J.  
Wood & Co., R. D., Philadelphia, Pa.

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\*Central Foundry Co., New York.  
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\*Ludlow Valve Co., Troy, N. Y.  
\*U. S. C. R. Pipe & Fdry. Co., Burlington, N. J.  
Chapman Valve Mfg. Co., Indian Orchard, Mass.  
Clow & Sons, J. B., Chicago, Ill.  
Columbian Iron Works, Chattanooga, Tenn.  
Darling Valve & Mfg. Co., Williamsport, Pa.  
Eddy Valve Co., Waterford, N. Y.  
Fairbanks Co., The, New York.  
Iowa Valve Co., Oskaloosa, Ia.  
Kennedy Valve Mfg. Co., Elmira, N. Y.  
Mueller Mfg. Co., H., Decatur, Ill.  
Pratt & Cady Co., Inc., Hartford, Conn.  
Rensselaer Valve Co., Troy, N. Y.  
Smith Mfg. Co., A. P., East Orange, N. J.  
Wood & Co., R. D., Philadelphia, Pa.

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Barrett Company, New York.  
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Minwax Co., The, New York.  
Protolox Corp., New York.  
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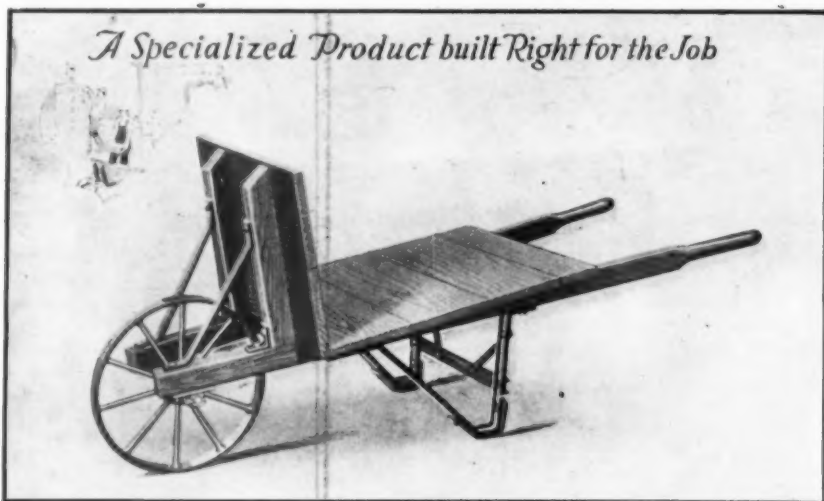
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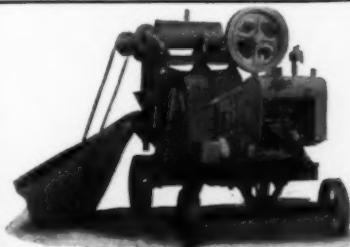
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Vol. VII

No. 6

# Contractors' and Engineers' Monthly

December

1923

Published Monthly at 443 Fourth Ave., New York, by The Civic Press, Inc. Printed in U. S. A.  
Branch Offices: Chicago, Ill., 123 W. Madison Street; San Francisco, Calif., 320 Market Street

## A Preconstruction Conference and a Construction Motion Picture Are Features of New Office Building

Remarkable Motion Picture Film Being Made of S. W. Straus & Company Building in Chicago

A FLOWER that is several days in blooming may be seen to blossom forth on the picture screen in a few moments. Now by the magic of the motion picture camera a 32-story skyscraper will rise in one reel in 16 minutes. This experiment has been tried before, but not with great success. In the past, the trouble has been that when different scenes were made the camera was in slightly different positions. A fraction of an inch difference in the position of the camera is so magnified on the screen that the general result is not satisfactory.

When the S. W. Straus Building on Michigan Boulevard, Chicago, was started, the Rothacker Film Company of that city made every effort to insure the desired results. In Grant Park, across the Boulevard, a mound was thrown up. Stilts were driven into this mound and on top of the stilts the camera house was built. The tripod was cemented to the floor and the camera bolted onto the tripod so that it could not move a hair's breadth. This motion picture equipment will remain as it is until the building is completed. Every day the camera man mounts to his house on the stilts and cranks a few feet of film. Shortly after the building is completed, audiences can behold a 32-story building being constructed in 16 minutes.

### Building Conference Preceded Construction

Building construction entered a new stage of development when, after the structural plans were completed for this \$18,000,000 32-story building, a building conference was held in which the construction cost was cut approx-

imately \$250,000, and added service features were provided for the future tenants. The rentable area was also increased through minor changes suggested by the foremost building owners and their technical advisors, who made up the personnel of the conference.

Such a conference, the first of its kind ever



THE MOTION PICTURE HOUSE ON STILTS FROM WHICH THE COMPLETE FILM OF THE CONSTRUCTION OF THE STRAUS BUILDING IS BEING TAKEN



A VIEW OF THE NEW STRAUS BUILDING UNDER CONSTRUCTION FROM THE MOVIE MAN'S HOUSE

held, is of greater significance because S. W. Straus & Company in making plans for its future home not only had the benefit of its own 41 years' experience in the financing of building construction and the experience of its architects, engineers and contractors, but also laid before the National Association of Building Owners and Managers the complete plans, so as to benefit from the experience of men engaged in the highly technical profession of managing office building property.

At the building conference it was voted that the plans as prepared by Graham, Anderson, Probst & White, architects for the new building, were 100 per cent perfect. The changes suggested by the members of the conference concerned largely those particulars which reflect the accumulated experience of the building managers representing the tenant point of view. An example of the savings effected is the increase in rentable area through changes in the toilet facilities, elevator and court plans. Instead of duplicating elevator door and signal equipment throughout the building, the corridor space between the elevator banks on all floors from the first to the thirteenth, where express cars will not stop, is to be utilized for extra office space. On these floors there will be no elevator entrance doors or other expensive equipment. Above the thirteenth floor the elevator corridor space in front of the local elevators from the sixteenth to the twenty-first floor will be used for office space not previously planned. This arrangement, together with the gains made by making the walls of the interior court perpendicular, instead of terraced, will add \$24,000 a year income to the building.

Another big saving was in the elimination of the chair rail which has always been considered an essential for the protection of the walls from contact with chairs. As a matter of fact, the chair rail does not protect the wall, because a chair usually makes a contact with a wall

above or below the rail line. At 35 cents a lineal foot, the amount of saving can be appreciated when it is realized that there are thousands of feet of wall in such a structure as the Straus Building. Other savings are effected through the elimination of sidewalk lights, of locks on inside office doors, of exterior windows in elevator banks, of one complete stack of toilets throughout the building, of the vacuum cleaning plant in favor of a small portable machine, and of the setback in the court.

#### Structural Features

The new Straus Building will be ready for occupancy about May 1, 1924. It will be the largest structure on the Michigan Avenue skyline of Chicago, and will be one of the finest examples

of office building architecture in the United States—a massive, towering structure of Bedford stone containing approximately 400,000 square feet of rentable office space, exclusive of the six floors to be occupied by the owners.

The main shaft of the building will rise to a height of 22 stories and carry a 10-story tower centered on the Michigan Avenue side. The structure will be in the form of a hollow square built around the perimeter of the lot, with an inside light court entirely surrounded by offices. Following the best examples of Florentine architecture, the exterior of the building will have a rusticated or deep joint treatment up to the sixth floor, above which there will be a plain ashlar finish with perpendicular lines emphasized to accentuate the height of the building, thus giving it imposing stateliness.

On the Michigan Avenue side the center section of the building, about 80 feet in width, will be set back 2 or 3 feet from the line of the corner sections and will be carried up the entire height of the structure into the tower. This setback will break the Michigan Avenue front sufficiently to give it a distinctive appearance.

The steel for the new building is being purchased from the Inland Steel Company of Chicago. The Thompson-Starrett Company is the contractor, and the supplies and materials for actual construction are being purchased by sub-contract by the general contractor.

#### Metal Windows to Be Used Throughout

After an extensive investigation it was decided to equip this building with metal windows. The tests have determined that through the use of metal windows, 3.6 square feet of glass can be added to each window, thereby increasing the amount of daylight throughout the building. As each typical suite would have two outside win-

dows, the amount of additional glass for the admission of daylight will be more than 7 square feet for each typical suite. The investigation showed that the metal windows are more attractive, easier to operate, and, in fact, productive of 10 per cent more daylight than the older type of wood window construction.

#### Interior Trim to Be Black Walnut

Contracts totaling close to \$500,000 for carpentry, mill work and cabinet work on this building were awarded to the Matthews Brothers Company of Milwaukee, Wis. The distinguishing characteristic of the contract is that all of the trim and cabinet work throughout the building is to be in solid black American walnut, making this structure, if not the only one, at least one of the few office buildings in Chicago using this beautiful native American wood. Of almost equal importance in the eyes of the lumber trade is the fact that the flooring throughout the rentable office space will be of 2-inch maple instead of the customary 2¼-inch

flooring where wood flooring is used. In making this selection the Straus organization came to the decision because the 2-inch maple flooring is better-looking and less apt to warp.

The choice of wood flooring is based on the assertion that wood is more pleasant than concrete from the standpoint of office workers, as it possesses more resiliency and warmth. While concrete is fire-proof, there is no special advantage in concrete in this particular if only the top floor surface is wood, because the under tiling is, of course, entirely fire-proof.

#### Large Hand-made Tackle Blocks Used by Contractor

The Thompson-Starrett Company is using some exceptionally large tackle blocks for handling the 68-ton plate girders on the new Straus Building. These blocks, supplied by the W. W. Patterson Company, Pittsburgh, Pa., are used on two large guy derricks. There are two 5-sheave blocks and six 6-sheave blocks. The former weigh 628 pounds each and the latter 720 pounds each.

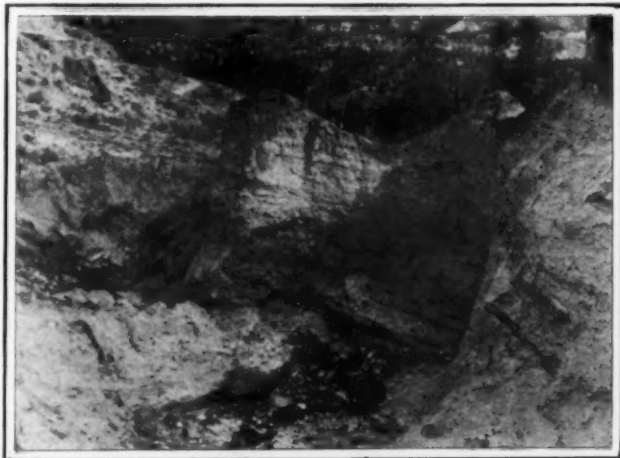
## Making Nature Build a Road

Surplus Water in Garfield County, Utah, Guided So As to Erode Highway from Escarpment to Valley Below

THE picturesque escarpment which forms the rim of the Great Basin and makes Bryce Canyon furnishes Garfield County, Utah, officials with a road problem of startling proportions which the officials are attempting to solve in a most unusual way.

In Garfield County the rim runs roughly northwest and southwest, with an altitude ranging from 7,500 to 9,000 feet above sea-level.

Towards the north and west it slopes off gradually, draining into the Sevier River. Toward the south and east it drops with a precipitous suddenness for about 3,000 feet and drains gradually into the Colorado River. The prosperous, if remote, agricultural and range settlements of Tropic, Cannonville and Henrieville rest close to the foot of the cliffs and along small streams which are devoted to



VIEW OF BRYCE CANYON ESCARPMENT, SHOWING EROSION WHICH HAS BEEN PRODUCED ARTIFICIALLY





A PINNACLE LEFT BY THE EROSION OF BRYCE CANYON IN NOVEL METHOD OF BUILDING ROAD

irrigation. Panguitch, the county seat, is on the uplands in the Sevier drainage and is a livestock center of some importance. Naturally, Tropic and its neighboring settlements desire and must have connection by highway with the county-seat and with the railroad which lies about 75 miles beyond.

There is a road which must be called such, since in summer the mail is carried over it daily. From Tropic this road climbs to the rim in a distance of five miles. It does most of the climbing in two miles of the five. A county commissioner was told by an engineer that the maximum adverse grade out of Tropic was 26 per cent. He did not know whether this was by actual survey or not, but when a pioneer roadway climbs something like 2,000 feet in 10,000 or thereabouts of horizontal distance, a few hundred yards of 26 per cent grade may be expected.

The road furnishes the problem to be solved by these officials. Bryce Canyon, the product of a few thousand or million years, suggested a possible solution. The geologic formation found on the rim at this point is susceptible to erosion.

Part of the irrigation supply of the territory around Tropic comes from the Sevier River headquarters. The canal leads to a low place on the rim, where during irrigation season an artificial waterfall some hundreds of feet high is created. The water is picked up again lower down and is distributed over farms, and ultimately some of it finds its way to the Imperial Valley or the Gulf of California.

perial Valley or the Gulf of California.

A few years ago a Garfield County commissioner conceived the idea that the erosive force of this stream of water might be used for road construction purposes. It was a "short cut" to a water grade road. Arrangements were made for the use of the stream during the flood-water season on the Sevier and prior to the irrigation season. The water was conducted to a low place on the rim near the present road and turned loose. It was the placer miner's hydraulic minus the pressure pipe line and nozzle. However, men were employed with pick and shovel to assist the eroding influence of the water. The plan is to direct the water into the eroding channel, which will cut back some hundreds of yards from the face of the cliff and will deposit the detritus or the heaviest portion of it at the bottom of the cliff. When the bottom of the artificial channel and the top of the artificial pile meet, there will be a new roadway, according to this theory, of fairly even grade.

The water is not available every year, and when available can be used for only a short season. In two seasons two parallel V-shaped channels have been cut in the rim of the cliff, extending back perhaps 200 or 300 feet and, at a guess, 75 feet deep at the rim. Another season, when the triangular prism between these channels is removed, the somewhat novel method of road construction will be well under way.

ACKNOWLEDGMENT. — Text and illustrations by courtesy of Western Highways Builder.

#### CARE OF CONSTRUCTION MACHINERY IN WINTER

It is not too late now to take care of construction machinery so that it will not be injured by the winter weather and so that it may be ready for service in the spring. There are many contractors who seem to overlook this question entirely. The equipment is hauled in from the job to an open lot and there it is allowed to remain the entire winter. Usually no attention is given the machinery until an actual job is started in the spring, and then there is a mad rush to get the machinery on the job.

## LEGAL POINTS FOR CONTRACTORS

These brief abstracts of court decisions in the contracting fields may aid you in avoiding legal difficulties. Local ordinances or state laws may alter the conditions in your community. If in doubt, consult your own lawyer

**Edited by A. L. H. Street, Attorney-at-Law**

### **Ordinance Requiring Contractor to Give Bond Under Private Contract Held to Be Void**

What the Michigan Supreme Court said in the recent case of *Harrigan & Reid Co. vs. Burton*, 195 Northwestern Reporter, 60, concerning the validity of an ordinance of the city of Detroit, requiring heating contractors to give bond in the sum of \$1,000 securing installation of equipment in compliance with regulations prescribed in the ordinance, may be applied broadly to the power of municipalities to impose conditions upon those entering into private contract relationships:

"Compelling a bond from the contractor to protect or indemnify the private citizen who chooses to make a legitimate contract with him for the purchase of a heating system or warming apparatus and installing it in his private dwelling suggests a measure of paternalism in the ordinary business relations of private parties beyond the normal scope of the police power of a municipality, as intimated in *Valentine v. Circuit Judge*, 124 Mich. 664, 83 N.W. 594, 50 L.R.A. 493, 83 Am. St. Rep. 352. It was there said that even the Legislature of this state is 'not empowered by the constitution to regulate contracts between its citizens who are engaged in legitimate commercial business, or to require any class of persons to pay a fee for the right to carry on business, or to give a bond to perform their contracts which other parties may choose to make with them.'"

### **Subcontractor's Right to Benefit of Materials Furnished**

A government contract for the construction of hangars provided that the contractors might use certain concrete piles and reinforcing steel on hand. The contractors sublet part of the work under a contract requiring the subcontractor to furnish all materials. Holding that the principal contractors were not entitled to credit against the subcontractor for the value of the government materials used by the subcontractor in performing the work, the United States Circuit Court of Appeals, Fourth Circuit, said in the case of *Stang vs. Mitchell vs. United States*, 290 Federal Reporter, 136:

"The plaintiff [subcontractor] did use the Government's reinforcing steel, and such steel would have cost it in open market some thousands of dollars. Defendants' [the principal contractors'] claim is that the money thus saved should be treated as a credit on the price defendants were to pay plaintiff. There is nothing in the subcontract which as much as hints at any such understanding. It is true that

the plaintiff bound itself to furnish all materials needed for its part of the work, and among the catalog of these required things reinforcing steel was specially enumerated. It is also true that the plaintiff, instead of furnishing steel, used that belonging to the Government; but its doing so cost the defendants nothing. If the plaintiffs had bought their own steel and used it, defendants would not have been a penny better off."

### **Contractor's Bond Held to Cover Material Taken Over on His Abandonment of Work**

A firm contracted to install a water-works system in a Kansas town and gave a statutory bond to prevent the attachment of mechanics' liens. The firm ordered hydrants, which were delivered. Before the hydrants were installed, the firm abandoned the contract, and the town took over the hydrants and installed them in completing the work. Under these circumstances, the Kansas Supreme Court holds in the case of *Ludlow Valve Manufacturing Co. vs. Fidelity & Casualty Company of New York*, 217 Pacific Reporter, 282, that the bond covered the hydrants.

Responding to a contention made on the part of the surety that, in order for the materialmen to have a lien, it must appear that the materials were "incorporated into the improvement by or with the authority of the contractor," the Court said:

"When the Garretsons abandoned the contract, the city was compelled to adopt measures to secure the completion of the water-works system. The city had a cause of action against the Garretsons for the damages sustained, but was compelled to adopt such reasonable measures as would mitigate the damages. . . . When the Garretsons quit work and abandoned the contract, they did not cancel the order for the hydrants nor return them after they arrived at Arcadia. The hydrants were left apparently for the city to do with as it pleased."

### **Ordinance Limiting Hours of Labor on Municipal Contract Work**

An ordinance of the city of St. Paul providing that eight hours shall constitute a day's work on any work done for the city, is constitutional and amply authorized by charter power to enact ordinances for the good government of the city and to promote the general welfare. Reaching these conclusions in the case of *City of St. Paul vs. Fielding &*

Shepley, Inc., 194 Northwestern Reporter, 18, the Court quoted the following language from the opinion of the United States Supreme Court in a similar case:

"It may be that the state, in enacting the statute, intended to give its sanction to the view held by many, that, all things considered, the general welfare of employees, mechanics and workmen, upon whom rest a portion of the burdens of government, will be subserved if labor performed for eight continuous hours was taken to be a full day's work; that the restriction of a day's work to that number of hours would promote mortality, improve the physical and intellectual condition of laborers and workmen and enable them the better to discharge the duties appertaining to citizenship. . . .

"We rest our decision upon the broad ground that the work being of a public character, absolutely under the control of the state and its municipal agents acting by its authority, it is for the state to prescribe the conditions under which it will permit work of that kind to be done. Its action touching such a matter is final so long as it does not, by its regulations, infringe the personal rights of others, and that has not been done."

#### **Rights Where There Is Defective Performance of Construction Contract**

By merely furnishing a contractor with a list of particulars in which it is claimed that he has failed to comply with the requirements of a construction agreement an owner does not preclude himself from afterward objecting on account of other defects, holds the New York Court of Appeals in the case of *Cawley vs. Weiner*, 140 Northeastern Reporter, 724. The Court said:

"Unless the plaintiff were in some way harmed by the action of these defendants in furnishing him with a list of the defects, how are they estopped from showing the departure from the plans and specifications? The contractor ought not to be paid for that which he has failed to furnish, unless there be, in fact, a waiver, which means an acceptance knowing of defects or else an estoppel, which means that the defendants are prevented from claiming the defects because it would be unfair to the plaintiff in view of their previous action."

In the same case it is decided that where in a proceeding to foreclose a mechanic's lien defendant owner shows that plaintiff contractor has defectively performed the work, entitling the defendant to deductions, the burden is on the contractor to show the reasonable cost of remedying the conditions. The Court said:

"The burden was upon the plaintiff to prove the reason for these defects or changes, or whether the condition was due to the plans and specifications, and not his defective workmanship. If these were proper items for which allowance could be made, the plaintiff should have proved what the reasonable cost would be to remedy the condition. The Court has allowed him the full amount of the contract price without any deduction for these apparent

defects and without any explanation in the findings for not making it."

#### **Essential to Valid Lien for Building Material Furnished**

Applying the lien law of California in the late case of *W. P. Fuller & Co. vs. Fleisher*, 218 Pacific Reporter, 53, the District Court of Appeal of that state said:

"In a suit to enforce a materialman's lien, it not only must be alleged and proved by the plaintiff that the material was actually used or consumed in the construction, alteration, addition to or repair of the building, but it also must be averred and proved that the material was furnished by the materialman expressly for that particular building. . . . It is not enough that the owner or contractor purchased the material for use in the building on which the lien is asserted; the materialman himself must have furnished it for use or consumption in that building."

#### **Interest of Materialmen in Funds Paid to Contractors**

The California statute purporting to make it embezzlement for a contractor to receive compensation for work and to fail to pay those furnishing labor or materials for the job, is unconstitutional as providing imprisonment for debt, holds the California District Court of Appeal in the case of *American Surety Co. vs. Bank of Italy*, 218 Pacific Reporter, 466. In part, the opinion says:

"It certainly cannot be considered that a trust relation, as to the moneys received by a contractor on the contract price of a building, between such contractor and his materialmen, mechanics, and laborers, can be worked out of the mechanic's lien law itself. Manifestly this cannot be done, since the relation between a building contractor and those he employs to assist, and who do assist, in the construction of a building by furnishing materials therefor and performing labor thereon, is only that of debtor and creditor. This is even true where the building contract is made in pursuance of the provisions of the mechanic's lien law. Such a contract, in and of itself, is, in its general legal characteristics, the same as any ordinary agreement between two or more parties to do or not to do a particular act or thing. It is taken out of the class of ordinary contracts only because the constitution has guaranteed to persons furnishing materials for and performing labor upon a building under it a special remedy, inapplicable to other kinds of contracts, for the satisfaction of their claims for such materials and labor. The statutory provisions relative to mechanics' and laborers' liens are merely intended for the effectual enforcement of the remedy so given, and the constitutional guaranty of such remedy and the code provisions designed for its proper enforcement have not had, nor were they intended to have, the effect of changing the legal relation between a building contractor and those whose materials and labor the former employs in furthering the construction of the building from that of debtor and creditor."

# The Economy of Winter Concrete Work

Much Time Saved, But Great Caution Must Be Taken in Winter Building with Concrete

A DISTINCT advantage is often gained by carrying on structural concrete work in the winter months. Construction work begun in the late summer or early fall may safely be continued throughout the winter, providing certain precautions be taken. Contractors have found that the cost of winter construction is from 3 to 10 per cent greater than the same work would cost in summer, but certain advantages of winter construction frequently offset a part or even all of the additional cost, so that the net results will prove an actual saving in construction. The material for the work can often be supplied in winter to the best advantage. Labor is more abundant and efficient, and the project can be manned with the best of the labor market. There is also the important additional advantage to the owner of having the building ready for occupancy at an earlier date.

Frequently it is imperative to have a structure completed and ready for use at the earliest possible time. Schools, residences, apartment houses, office buildings and hotels are usually needed by a certain date. Earlier occupancy of such structures is of prime importance also from the investment standpoint. Money provided for building construction earns nothing for the borrower until it is represented as an investment in a completed structure, either rented or occupied by the business for which it is intended. It is often penny-wise and pound-foolish to delay the construction of a needed concrete building because of cold weather, for the extra cost of construction in winter would often be more than offset by the interest saved on the money provided for its construction. The bonus or royalty often paid

for the completion of a building before a specified time is tangible evidence of the value placed upon early occupancy by large corporations.

## Fundamentals of Cold Weather Concreting

In order to place concrete successfully in cold weather it is necessary to follow certain methods and observe precautions which are easily comprehended by any one with an understanding of the action of concrete in hardening. The hardening of concrete is not a process of drying out, as some people suppose, but is a chemical reaction between the cement and the water used in the mixing. Two things are necessary for proper hardening, namely, warmth and moisture.

Low temperatures will retard the hardening of concrete, and extreme cold will prevent it altogether. Since water is necessary for the chemical action of hardening, evaporation of the water used in mixing the concrete must be prevented. This is often done by keeping the surface covered with wet sand, sawdust or burlap. As the temperature is lowered and the moisture content is reduced, the gain in strength and the entire hardening process become much slower and practically cease when the temperature of the water used in mixing falls

### Five Rules Which Must Be Followed to Insure Strong Concrete When Placed in Winter

1. The safest practise is to protect newly placed concrete as soon as possible, before it has time to freeze. There is no certainty that concrete that has been frozen once will ever attain its full strength. Repeated freezing and thawing will cause serious injury and may necessitate removal of the concrete. No freezing whatever should be permitted in concrete that will be subjected to abrasion, as in floors and pavements.
2. Heat the aggregate and mixing water so that the concrete when placed will have a temperature not lower than 65 degrees Fahrenheit.
3. Place the concrete in the forms immediately after mixing, so that little heat will be lost.
4. Protect the concrete as soon as placed, in order to retain the heat. Canvas covering, sheathing or a layer of clean straw will furnish sufficient protection for some work in mild weather. If the straw contains any manure, cover the concrete with a layer of tar paper to prevent damage to the freshly laid concrete from acids in the manure. Where work can be enclosed, open coke stoves or salamanders may be used. In severe weather such protection as heating should be continued for at least five days.
5. The concrete must be strong enough to support all imposed loads before the forms are removed. Examine by pouring hot water on the concrete or by heating in some other way. Be sure the concrete has hardened, not merely frozen.

to the freezing point.

There is no certainty that newly placed concrete that has been frozen even once and has then been thawed out and protected from further freezing until final hardening has taken place will ever attain its full strength. The only safe practise is to protect the freshly placed concrete as soon as possible before it has time to freeze. If alternate freezing and

thawing occur several times, the concrete will be seriously injured and may have to be removed. Concrete that will be subjected to abrasion, as in floors and pavements, should under no circumstances be allowed to freeze at all. The exact period that may be allowed to elapse in placing concrete and subjecting it to freezing temperatures cannot be definitely stated, because of the influence of unknown variations in temperatures and other conditions. Experience shows that this period should never be less than 48 hours, and if the outside temperature averages below freezing, three to five days should be allowed.

#### Heating Materials for Winter Work

Since warmth and moisture are required for the proper hardening of concrete, cold weather work should be planned with those necessities in view. Both the mixing water and the aggregates should be heated. The cement forms but a small portion of the concrete and need not be heated, but it is well to keep it in a warm place for a few hours before it is used.

The nearer the temperature of the water is to the boiling point, the better will be the results, because it will take longer to dissipate the heat and cool the mixture. There are several types of water heaters than can be used, but the most common method of heating is to pass steam into the water-tank. The concrete should be mixed with the least amount of water practicable to produce a workable, plastic mixture. An excess of water must be carefully avoided.

Many methods are used for heating aggregates. A simple method is to use a length of iron pipe, an old boiler, or any metal cylinder over which the sand, broken stone or pebbles can be piled and in which a fire can be built. Care must be taken to heat the fine and coarse aggregates separately in order to avoid pre-mixing them in the wrong proportions. As this method entails rehandling the aggregate, and as the aggregates nearest the heater may be affected by excessive heat, the use of steam pipes is generally preferred.

Steam heating is a more expensive method and requires a steam boiler, but on large jobs this method is usually advantageous, because the steam may also be used for other purposes. A practical method is to use a perforated steam pipe with a pointed end which can be worked into the piles of aggregate. To reduce loss of heat, the piles of aggregate should be covered with tarpaulins.

If the materials are heated as above outlined and the concrete is deposited immediately after mixing, its temperature when placed in the forms will be around 80 degrees Fahrenheit, and if care is taken to prevent too rapid loss of this contained heat, the concrete will harden rapidly. The early stages of hardening may be even more rapid than under ordinary conditions.

#### Heating the Forms

The forms must be free from snow, ice and frost and should also, if possible, be reasonably warm, especially in the case of metal

forms, which will rapidly absorb heat from the concrete. Live steam is an effective agent for cleaning ice and snow from the forms and warming them, and should be used just before the concrete is placed.

#### Protection and Supplying Heat While Hardening

A rapid loss of contained heat in the concrete after placing must be prevented. Protect the concrete while hardening, so as to maintain the warm, moist condition essential for rapid development of strength. There are many methods of doing this. The most common is to use an enclosure of canvas or tarpaulins. In mild weather this alone may be sufficient, but when the temperature drops below the freezing point, some means should be provided for heating the enclosure. Steam escaping from perforated steam pipes around the concrete will give the best results, because the steam saturates the air and prevents evaporation of moisture from the concrete.

Coke salamanders or stoves are often used when steam is not available to supply warmth to the enclosure, but large pans of water should be placed over them in order to provide as much moisture in the air as possible. Care should be taken not to have these stoves or salamanders so close to the concrete as to dry it out in spots, and an even temperature of at least 60 degrees Fahrenheit should be maintained at all times in all parts of the enclosure. To maintain this temperature within a properly housed enclosure in cold weather with good coke properly handled, one salamander will be required for every 300 to 500 square feet of floor area.

The most common practise is to build enclosures of tarpaulin overlapped so as to prevent rapid escape of heat, about two stories being enclosed at one time. Undoubtedly a better method was the one followed in the winter of 1922-23 in the construction of the Keenan Hotel, a 14-story reinforced concrete building in Fort Wayne, Ind. On this job five stories were enclosed at one time. This prolonged the length of time during which freshly placed concrete was kept warm, and resulted in complete hardening before the protection was removed. The Majestic Building in Milwaukee was built under a complete enclosure of tarpaulin supported on framework. Complete enclosures necessarily cost more than temporary ones that protect only a few stories at a time. Their great advantage, however, consists in the fact that they protect the workmen of all trades, and speed up the work from beginning to end. Furthermore, when once built, they require no shifting.

The complete-enclosure idea was followed in the construction of the three-span reinforced concrete arch bridge over the Little Goose River in Wyoming. A large tent covered the entire bridge site and permitted construction during severe winter weather when the stream was solidly frozen over. The cold weather, in fact, eliminated troubles from running water and actually speeded up the progress of the work. Fires were kept going in stoves with



smoke outlets extending through the top of the tent. During the placing of concrete a heavy snow-storm, followed by severe cold which lasted several days, tested the effectiveness of the tent. The protection proved equal to the emergency. For retaining walls and similar structures, a light roofing paper envelope placed outside the forms, with steam pipes placed at the bottom, has proved satisfactory.

#### Protective Coverings

When it is warm during the day, with a temperature drop close to the freezing point at night, floors, pavements and foundations are often protected by covering with straw, hay or other material, with satisfactory results, but such covering should not be relied upon during protracted low temperatures. Even though the outdoor temperature may not drop to freezing, protection is necessary to prevent the concrete from losing the heat introduced by heating the materials, and to insure proper hardening. At low temperatures the heat developed by the chemical reaction of the cement and water is too small to be safely relied upon except in large masses underground. Even in those cases, the material should be heated and the surface

protected.

The structural members and floors have such a large surface area in proportion to their size that the heat within the concrete is dissipated rapidly, and therefore protection must be provided. Recent inspection of several concrete floors placed during the winter of 1922-23 disclosed the fact that the top surface was inadequately protected after being placed. It is known that on one floor in particular the top surface was placed during cold weather and no protection whatever was provided. It was permitted to freeze almost immediately after it was placed, and it probably froze and thawed several times before it hardened. The result was an unsatisfactory wearing surface which in many places must be removed and replaced. Work of this kind should be protected with canvas, supported lightly above the surface, and with live steam forced under the canvas. The steam has the excellent characteristic of providing both heat and moisture—both essential in obtaining the best results.

**EDITORIAL NOTE.**—Literature amplifying this subject may be secured without charge from the Portland Cement Association, 111 West Washington Street, Chicago, Ill., by readers of *CONTRACTORS' & ENGINEERS' MONTHLY*.

## More Water for Brooklyn, N. Y.

Description of the T. A. Gillespie Company's Eight-Mile Water-Main Contract for the Borough That Has Outgrown the Older City

**T**HE ever-increasing demand for water by Greater New York has led to extensive enlargements and extensions of the present system by the Board of Water Supply of the City of New York. At the present time, the T. S. Gillespie Company of New York is engaged in a large contract which involves the distribution of the water from the Catskill Aqueduct to the Flatbush and Bay Ridge sections of Brooklyn, and incidentally the hooking up of this system with the Silver Spring reservoir on Staten Island by means of siphons now under construction across the Narrows in New York Harbor.

The additional supply for Brooklyn calls for the laying of 8 miles of 72-inch Lock-Bar steel pipe manufactured by the East Jersey Pipe Company. To carry this pipe, a 10- x 10-foot trench is being excavated. The contractors have a fleet of equipment on the job, including two 30-B Bucyrus shovels with extra clam-shell and dragline equipment and oversize boilers designed for burning wood when necessary; two Austin trench excavators, one steam- and one gasoline-operated; two Keystone excavators; one Brownhoist crane and one Northwest gasoline crane, all of which are to be used on the various parts of the work where conditions warrant.

The 20-B Bucyrus shovel during September was equipped with a Blaw-Knox bucket and was handling the difficult task of excavating for the trench where it drops under the tracks of

the Long Island and the Brooklyn Rapid Transit Railways at Fort Hamilton Parkway and 61st Street, Brooklyn. The machine is operating from the viaduct and loading trucks. Work is complicated by the fact that the high parapet of the bridge prevents the operator from seeing the trench. In spite of this, however, good progress is being made. The other 30-B has been used for heavy excavation with dragline as well as clam-shell buckets and for general utility purposes. When equipped as a crane, it has been unloading pipe and equipment. This fall, both machines have cut what is known as Shaft 23 at Flatbush Avenue and 3rd Street and worked through the city streets to 23rd Street, 22,000 feet in all. One is equipped as a shovel with a 3/4-yard sewer dipper and a 30-foot dipper handle and is going ahead on the main excavation. It is followed by the second 30-B equipped with a 40-foot clam-shell boom and bucket. This machine will excavate where necessary, do the backfilling and lay the pipe. This part of the work was held up until the last, as the Board of Water Supply is obligated to the city to turn over Fort Hamilton Parkway to the city first. On this job, 18,000 feet from 37th Street South must be done in 1923, and the work is being pushed very near to completion.

The work is under the direction of A. C. Askenheil, Superintendent.

**ACKNOWLEDGMENT.**—Abstract of an article in *The Excavating Engineer*.

## Fair Play for Employees

Appreciation of Faithful Work Redounds to Employer's Organization

A CONTRACTOR is entitled to, and should insist upon getting, a full dollar's worth of service for each dollar he pays in wages, just as he is entitled to, and should insist upon getting, fair recompense for his own services. He should expect, and insist upon getting, the same high quality of service from his employees that he yields to those who employ him. In their essentials the ethics which govern a contractor in his relations with owners, architects and engineers, should govern him in his relation with his own employees.

Very little consideration should be shown an employee who deliberately shirks his task—performs less than a fair day's work for a full

day's pay. Limitation of output is injurious to the workman himself, as it is to all industry. It cannot be defended upon any tenable theory. It benefits no one and injures all. Furthermore, it creates discontent. No man who does less than his best feels that healthy pride in his craftsmanship which distinguishes the good workman. No man can take pleasure in his work who "kills time" on the job. Shirkers are invariably discontented. A slacker never feels any sense of pride in his craftsmanship, and no man in whom is lacking a sense of pride in his own work will ever develop any skill of which to be proud.

There rests upon the employer an obligation to show himself appreciative of good work. No one likes to feel that he is merely one of a gang—that the individual merit of his work will not be appreciated. It is not enough that the mechanic create through his skill and imagination results denied to unskilled men. Accompanying pride in accomplishment is a demand that others recognize and acknowledge his skill.

### Acknowledge Intelligent Effort

Not only does an employer who fails to recognize and acknowledge intelligent effort on the part of his employees fail to perform a simple act of justice, but the failure is quite apt to result in lowered output. Recognition of service ought, of course, to spring spontaneously from the fact that it is a simple act of kindness and justice, but the fact is that like other good deeds it brings substantial reward. It is a good thing for an employer who has graduated from the ranks—and nine-

tenths of those engaged in the various branches of the construction industry have done so—to recall once in a while his younger days, and his own reactions, when he was an employee, to the treatment he received. The light of his past experience might give him a better understanding of the attitude of his employees.

An employer who fails to express recognition of intelligent effort and loyalty on the part of his employees plays directly into the hands of that discordant element in American life that would overturn things of proved worth and create chaos. A workman ambitious to better his condition who feels that he is getting a square deal and that the future lies in his own

hands is not apt to go very far along the road of radicalism. On the other hand, a workman who is dissatisfied is not apt to exert himself very greatly in his employer's behalf. He becomes an easy convert to the unworkable theories of the radicals. When a man relaxes his moral and mental fiber, and says, "I am not going to be any better workman than I am today; I am just one of a crowd, and there is no future for me,"

he is in a bad way, for he has created a state of mind which closes the door of progress and development, although other men about him are making their own opportunities, just as his employer, very likely, did.

### A Square Deal

Said a building mechanic recently: "A man who works for Blank can be sure of getting a square deal. He treats his men white."

When Blank leaves this earthly sphere, no finer eulogy may be spoken than the little testimonial of the building mechanic. An employer of labor who gives his employees a square deal, in whose justice and sense of fair play they have confidence, is a man whom one is pretty safe in trusting in any of the affairs of life.

### Faithful Employees Nucleus of Organization

Many industrial organizations are so large that it would be manifestly impossible for the executive head to note or acknowledge evidences of unusual skill and loyalty. But the executive head picks the superintendents and the foremen, and he should see to it that they are men of kindly impulses—impulses which have not, however, degenerated into mawkish sentimentality—men possessed of an upstanding sense of fair play and justice—men who accept the fact that intelligent effort on the part of employees should be recognized and who are willing to devote some time and thought to searching for evidences of loyalty and to their recognition.

Nearly every firm engaged in the construction industry, especially in those sections which are not dominated by the closed shop, maintains a nucleus of faithful, trusted employees. These men are always the last to be released from employment in times of industrial stagnation.

Usually a bond of personal friendship, and of mutual understanding and trust, exists between them and their employers. These men generally form the backbone of an organization, and upon them is largely dependent the financial success or failure of many undertakings. They are loyal to the organization by which they are employed because of the bond of sympathy and appreciation that has grown up between them and their employers. Once they become imbued with the idea that there is no appreciation of

their work—no recognition of the part they play in the success of the firm—and their enthusiasm and joy in work vanishes. They have lost the fine attribute of loyalty, and both they and their employers are losers. That condition sometimes follows a change in management, when the older employees feel that there is no mutual sympathy or understanding and points of friendly contact with their employers become points of friction.

—*The Improvement Bulletin.*

## Welded Copper Expansion Joints on Large Dam

Shop Job Satisfactorily Handled in the Field

**I**N the construction of a large concrete dam at Cisco, Texas, 24,000 pounds of sheet copper were used in the expansion joints, all of which were fabricated by oxyacetylene welding by operators of one of the local job welding shops. The dam is of concrete construction, 1,700 feet long, and the copper expansion joints run up the faces of the abutments to a height of approximately 180 feet and at an angle of 45 degrees. Copper sheets for the joints measured 40 inches by 12 feet by  $\frac{3}{8}$ -inch thick. They were cold-rolled and very hard, and before the welding it was necessary to shape the sheets with a press built on the job.

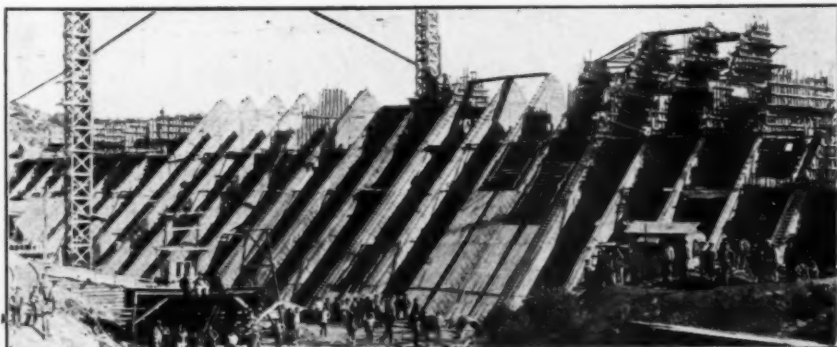
First, the sheets were upset at the center in the press along the 12-foot length in the shape of a pyramid 6 inches high, rounded at the top and 1 inch wide at the bottom. Then the edges of both sides were flanged up 2 inches by the same press. When formed, the space between the flanged sides and the base of the pyramid measured 12 inches. To form the joints, the sheets were welded end to end every 12 feet and placed on the face of every fourth abutment. When the concrete slabs were poured on top of the abutment along the face of the

dam, the copper pyramid was left free and separated the slabs over the entire height of the abutment. The 12-inch copper wings and the flanged sides, however, were imbedded in the slabs. Thus the expansion and contraction in the concrete will be taken up by the pyramids in the copper joints and the dam made waterproof at the same time.

Welding was made especially difficult by the inaccessibility of the joints, the welders being forced to work in cramped positions, and the wood forms for the concrete prevented preheating. Had it been possible to preheat the metal around the seams, the work would have been much easier. The Prestolite and Linde cylinders had to be lowered in a cradle over the point at which the operators worked, by means of high lines working from the two sides of the canyon in which the dam is located. Regardless of the difficulties encountered, all the expansion joints were welded in less time than the general contractors had estimated.

The principal factor was not the time required for the work, however, as permanently tight joints were the foremost requirement of the builders.

ACKNOWLEDGMENT.—Courtesy of Oxy-Acetylene Tips.



A SECTION OF THE NEW CONCRETE DAM AT CISCO, TEXAS, IN EVERY FOURTH ABUTMENT OF WHICH WELDED COPPER EXPANSION JOINTS WERE PLACED

## A New $\frac{1}{3}$ -Yard Gasoline Shovel

Small Shovel Developed in the Excavating Equipment Field

**S**INCE there are many classes of work where the yardage to be handled does not warrant the equipment investment common to the purchase of a  $\frac{3}{4}$ -yard or larger shovel, the Insley Manufacturing Company, Indianapolis, Ind., has developed a  $\frac{1}{3}$ -yard gasoline shovel which should be of interest to contractors having a moderate daily yardage to handle.

This new machine embodies many new features of shovel design, is ruggedly constructed

so as to stand up under severe operating conditions, and is driven by a Fordson unit. The connections between the shovel proper and the power-plant are such that the two can be disconnected quickly, leaving the tractor free for other work. It is a one-man unit, and while operated primarily as a shovel with a  $\frac{1}{3}$ -yard dipper, it can be used for ditching or clam-shell work with a  $\frac{1}{2}$ -yard ditcher scoop or with an attachment for use as a crane.



THE NEW INSLEY  $\frac{1}{3}$ -YARD GASOLINE SHOVEL AT WORK

## Huge Building Company Organized in Tokio

**A** BUILDING construction company is being organized in Tokio for the construction of commercial and industrial buildings on the unit basis, according to a report received by the Far Eastern Division of the Department of Commerce. This company plans to specialize in four-story reinforced concrete buildings, designed to withstand earthquake shocks. Such material as cannot be obtained locally or cannot be supplied in standard specifications will be obtained abroad.

Funds for the promotion of this new company will, according to present plans, be obtained in large part from the Government at a

low interest rate. At present the company is marking time, awaiting the announcement of the plans of the Capitol Restoration Board as to the areas set aside for industrial and business purposes. Announcement of the general plans for reconstruction, as worked out by the Reconstruction Board, is expected at any time. Meanwhile temporary construction is in progress in a big way in Tokio and Yokohama, and permanent building is, of course, being delayed until after the promulgation of regulations designating commercial and industrial zones, heights of buildings, materials to be used and so forth, has been completed.

## Prospects for Future Construction Work in Alaska

Completion of the Alaska Railroad Opens Up Remarkable Territory for Development

**W**ITH the recent completion of the Tanana River Bridge, the Alaska Railroad has passed through its construction period, and nine years of work in driving a standard-gauge railroad from the seacoast to the interior of Alaska is finished. Trains on a twice-a-week schedule make the 470-mile trip from Seward to Fairbanks in two days, running only in the daytime, so that none of the scenery may be missed.

In the construction of the railroad, 17,694,171 cubic yards of material were moved, made up of 7,348,256 cubic yards of dirt, 1,291,777 cubic yards of loose rock, 3,035,755 cubic yards of frozen rock, and 4,894,563 cubic yards of solid rock. The swell of this material was 1,123,820 cubic yards. As a part of the equipment which handled this excavation, there were three veteran Marion shovels which had been



A SECTION OF THE ROAD-BED OF THE ALASKA RAILROAD UNDER CONSTRUCTION, SHOWING SOLID ROCK EXCAVATION

used on former construction work. The smallest of these, a Marion 40 with a 1½-ton bucket, belonged to the old Alaska Northern Railroad, which was purchased by the Alaskan Engineering Commission. The other two, of the Marion



A MARION STEAM SHOVEL, FORMERLY USED BY THE GOVERNMENT IN BUILDING THE PANAMA CANAL, AT WORK ON THE SNOWY SLOPES OF A MOUNTAIN NOW TRAVERSED BY THE ALASKA RAILROAD





**THE SECOND LONGEST SINGLE-SPAN RAILROAD BRIDGE IN THE WORLD, ACROSS THE TANANA RIVER AT NENANA, ALASKA**

Completion of this bridge in April, 1923, finished the construction of the Alaska Railroad

"60" type with  $2\frac{1}{2}$ -ton buckets, helped to dig the Panama Canal and then were shipped to Alaska.

#### History of the Alaska Railroad

After many years of investigation and consideration, Congress passed an act, on March 12, 1914, which authorized the President to construct and operate railroads in Alaska. The work was delegated to the Interior Department, probably because that department has been the closest of all to the problems of Alaska. The selection of a route from an open-all-the-year-round seaport to the interior of Alaska formed the first problem, and this was finally narrowed down to a choice between two routes. One of these would take over the Copper River and Northwestern Railroad and extend it along the Richardson Highway to Fairbanks, and the other, which was finally selected, would begin at Seward, pass around Turnagain Arm, across the Matanuska Valley, up the Susitna Valley over Broad Pass, and thence along the Nenana River and the drainage system of the Tanana River to Fairbanks.

The selected route touches and passes through two of the three well-known coal fields of Alaska, it taps the only large agricultural lands, is tributary to several mining districts, none of which has as yet reached the full stage of development, and borders the Mt. McKinley National Park, which contains America's highest mountain peak, probably some day destined to be the visiting place of many tourists. The total distance is approximately 470 miles, with a branch line of 40 miles to the Matanuska coal fields, and several shorter spur tracks to other coal fields and properties. The railroad was built in a wilderness where every facility had to be developed and carried along with the actual construction work. Ocean docks,

towns and camps, railroad shops, supply terminals and even the wagon roads over which supplies were hauled, formed a necessary part of the plan. All equipment had to be shipped from Seattle, the nearest Pacific Coast port, which was from 1,500 to 2,500 miles away. Notwithstanding these conditions, the railroad was built at a cost of approximately \$85,000 a mile, inclusive of rolling stock.

#### The Tanana River Bridge

The Tanana River bridge, which was the last piece of construction, is unique in several respects. With a single span of 700 feet, it is the second longest single-span railroad bridge in the world, being exceeded only by a similar

bridge in St. Louis. It is the farthest north of big bridges. It was built in the middle of winter, when the temperature on many days was as low as 40 to 50 degrees below zero.

Before the bridge was built, a narrow-gage track was used from Fairbanks to the north bank of the Tanana River. Crossing the river to connect with the standard-gage track running from the Seward to the south bank of the river was a problem. In the summer months two ferry-boats were used. Ice forms in the river during October, and by the last of that month it reaches a thickness of three to four feet. The narrow-gage track was then extended onto the ice, and trains from the north side were run over the ice to the south bank. When the ice began to weaken, early in May, dog teams and sledges were used to take freight and passengers over the crossing.

Winter was selected for building the bridge, as it affords a six months' period when the only difficulty is the low temperature. From the time the ice goes out of the Tanana River until it forms again in the fall, there is only a period of three months when work can be carried on, but it is in the face of constant danger from the spring and summer floods, which are strong enough to carry entire trees with roots still intact against the false work. The bridge as it now stands has a clearance of 47 feet above the mean summer high water from pier to pier, giving ample room to permit the passage of boats designed to navigate the upper Tanana River, and doing away entirely with the hazards of floods and ice break-ups.

#### The Value of the Railroad to Alaska

The government-built Alaska Railroad will prove to be the largest single factor in the development of the northern territory. Prior

to the construction of this railroad the interior of Alaska could be reached only by a river boat in the summer time and by dog sleds in the winter. Merchants of the interior were compelled to order in one shipment all the supplies needed for the following season. With high transportation costs and the necessity of computing profits on the basis of a single annual turnover, prices were high in the interior. Prices once set were maintained until the following year. When the first boats reached Fairbanks in June, 1920, sugar was retailing at 29 cents a pound, the price set during the preceding year, although the price for this commodity had dropped to 6 cents a pound in the United States. With the completion of the railroad, shipments can reach the interior twice each week during the entire year, as Seward, the southern terminus of the railroad, is open to navigation at all times, and traffic, although impeded at times by snowslides, is maintained continuously during the winter months.

The nightmare of the gold rush to Alaska, which swelled the population temporarily and then reduced it as quickly with the great out-

flowing of wealth panned from the streams, is a thing of the past. The development of Alaska in the future will be through permanent industries, mostly mining, however, but developments which will be built on long-lived ore bodies that insure a pay-roll for workers over an extended period.

#### Washouts on Alaska Railroad

During the latter part of October a severe rainstorm combined with a high tide, 6 feet above any record level, put 100 miles of the Alaska Railroad out of commission, according to a report received by Secretary of the Interior Work from railroad officials at Anchorage, Alaska. No estimate of the damage was given, but the entire section of the line between Seward and Potter had suffered from washed-out embankments and cave-ins on cuts. Two large bridges near Spencer Glacier and Bartlett Glacier were washed away. The bridge destroyed at Spencer Glacier had a 120-foot span. In spite of these washouts, however, the road was closed for a period of only about two weeks.



A SECTION OF THE COMPLETED TRACK ON THE ANCHORAGE DIVISION OF THE ALASKA RAILROAD, SHOWING THE CONSTRUCTION DIFFICULTIES WHICH HAD TO BE OVERCOME

#### Maintenance Should Begin as Soon as a Road Is Finished

THE time to begin to repair a good road is the day it is opened to traffic. Homely philosophy says that a stitch in time saves nine, and road experience proves that a bucket of oil, a little sand, a few rocks, and a man with a shovel can save the expense of a whole road gang and expensive machinery later.

The modern road consists of a foundation course of stone, a smaller, lighter course on top, a wearing course of still smaller stones, a binder of oil and sand, and perhaps a top dressing of the same, asphalt top or solid concrete. As long as the structure is complete, the road will wear. But let time, or a too heavy load, or frost, or some other cause, dig a hole through the wearing course into the foundation, and the

"bad spot" will begin to "ravel." Stones will break away and roll down in the ditch, the surface will disintegrate, and in a comparatively short time a large and rough hole appears.

A good road is no better than its worst mile. A mile of holes and ruts cuts down the usefulness of ten miles of good road. To repair a large hole costs much money. To inspect the road often and stop up the little hole when it starts is very inexpensive. The greatest city fire in history could have been put out by a child with a cup of water if found in time. So can the worst possible damage to roads be inexpensively prevented, if the maintenance is begun in time.

—Michigan Roads and Pavements.

# Building Conditions in the United States

Prepared by S. W. Straus & Company

## Stabilized Conditions Promote Building in November

**N**OVEMBER, 1923, showed a greater volume of building permits for the entire country than any previous November, and it was the third highest month of the current year, March still holding the monthly record for 1923. The whole country showed a gain of 30 per cent over November last year and 5 per cent over October of this year. The gain over October, although small, was nevertheless surprising, as November has always showed a decline from October, with the exception of last year.

The 287 cities reported in this survey show a total of \$301,054,967. The only other month this year, with the exception of March, which surpassed \$350,000,000, was April, when 284 cities had a total of \$350,957,000. After April there was a slight decline in the volume of building throughout the country until August, when the great activity which now prevails began to gather momentum. That it has centered in the larger cities is shown in an accompanying table, where the 25 cities with the largest volume of building permits for November present a total of \$214,408,114, compared with \$301,054,967 in 287 cities. These 25 cities represent about 20 per cent of the nation's population and about 30 per cent of the nation's building.

New York, where about 15 per cent of the entire country's building operations are now going forward, came very near topping the one-hundred-million-dollar mark for the month, surpassing its figure of last November by more than \$40,000,000, showing a gain over October this year of more than \$35,000,000. Other large cities which showed phenomenal gains over November, 1922, were: St. Paul, 331 per cent; Toledo, 132 per cent; Cleveland, 81 per cent; St. Louis, 60 per cent; Milwaukee, 54 per cent; San Francisco, 47 per cent; Chicago, 33 per cent; Boston, 26 per cent; Los Angeles, 19 per cent; Nashville, 141 per cent; and Washington, D. C., 35 per cent.

The gain for the entire country over the eleven months of last year exceeded 25 per cent.

### Labor and Material

There were declines of minor importance in building costs, including concreting material, lumber, clay products and paint. The stabilized conditions have done much to stimulate activity, which was further assisted by increased labor efficiency.

### SUMMARY OF NOVEMBER PERMITS BY REGIONS

No. Cities	Regions	Nov. '23	Nov. '22	Oct. '23	Nov. Gain	Oct. Gain
86	East.....	\$154,975,804	\$110,413,441	\$122,950,294	\$44,562,363 40%	\$32,025,510 26%
101	Central.....	88,179,612	75,378,924	97,029,108	12,800,688 17%	8,849,406 9%
43	South.....	19,942,026	14,470,376	20,089,411	5,471,650 38%	147,383 1%
46	West.....	36,489,734	30,175,984	45,108,185	6,313,750 21%	8,708,451 19%
276	Total.....	\$299,587,176	\$230,438,725	\$285,266,998	\$69,148,451 30%	\$14,320,178 5%

### TWENTY-FIVE CITIES SHOWING LARGEST VOLUME OF PERMITS FOR NOVEMBER, 1923, COMPARED WITH NOVEMBER, 1922, AND OCTOBER, 1923

	Nov., 1923	Nov., 1922	Oct., 1923	Gain Nov.-Nov.	Gain Nov.-Oct.
1. New York.....	99,253,659	59,002,991	63,575,807	40,250,668	35,677,852
2. Chicago.....	27,130,550	20,443,000	27,837,350	6,687,550	706,800*
3. Los Angeles.....	13,512,042	11,355,710	20,541,872	2,156,332	7,029,830*
4. Detroit.....	8,390,556	7,734,527	12,485,880	656,029	4,095,324*
5. Cleveland.....	6,905,900	3,805,150	5,733,300	3,100,750	1,172,600
6. Philadelphia.....	5,406,040	11,416,730	10,949,310	6,010,690*	5,543,270*
7. St. Paul.....	4,865,156	1,128,517	3,736,639	3,736,639	3,164,548
8. St. Louis.....	4,571,525	2,850,789	2,111,695	1,720,736	2,459,830
9. Washington, D. C.....	4,414,861	3,258,652	2,273,096	1,156,209	2,141,765
10. San Francisco.....	3,850,808	2,620,471	3,793,374	1,230,337	57,434
11. Baltimore.....	3,429,540	2,588,520	3,854,988	841,020	425,448*
12. Buffalo.....	3,281,000	2,569,000	2,306,000	712,000	975,000
13. Milwaukee.....	3,053,840	1,978,081	6,051,673	1,075,759	2,997,833*
14. Newark.....	3,039,459	2,657,199	2,733,463	382,260	305,996
15. Nashville.....	2,895,572	192,225	710,375	2,703,347	2,185,197
16. Oakland.....	2,448,612	1,938,322	3,556,341	510,290	1,107,729*
17. Boston.....	2,336,472	2,584,752	2,759,208	248,280*	422,736*
18. Pittsburgh.....	2,266,623	2,278,958	2,061,448	12,335*	205,175
19. Rochester.....	2,166,302	1,316,106	2,025,528	850,196	140,774
20. Minneapolis.....	2,056,275	2,893,410	2,416,315	837,135	360,040*
21. Long Beach.....	1,925,828	1,046,465	2,336,695	879,363	410,867*
22. Atlanta.....	1,889,264	1,705,588	1,133,323	183,676	755,941
23. Indianapolis.....	1,858,565	2,503,014	2,757,826	694,449*	919,261*
24. Memphis.....	1,807,520	1,180,615	1,017,250	617,905	790,270
25. Portland, Oregon.....	1,672,145	1,858,550	2,566,335	186,405*	894,190*
	214,408,114	152,916,342	189,289,060	61,491,772 40% net gain	25,119,054 13% net gain

(\*)



TRAIN OF TRAILERS OWNED BY BOXLEY, CHISHOLM & HALL, TROUTVILLE, VA., BEING LOADED BY AN ERIE STEAM SHOVEL

## Tractor and Trailers Reduce Road-Building Costs

W. W. Boxley & Company, Roanoke, Va., Making Good Speed on Bituminous Macadam Road in Troutville, Va.

WHEN W. W. Boxley & Company, the parent company of Boxley, Chisholm & Hall, located at Roanoke, Va., started the construction of seven miles of bituminous macadam road in Botetourt County near Troutville, Va., they were confirmed truck users. When the superintendent in charge received the tractor and trailer equipment, it was with some misgivings that he started operation.

The road is being constructed with a hard

surface 18 feet wide and with a 4-foot shoulder on each side. The Holt Caterpillar 10-ton tractor and four Model RS-4 Troy slow-speed trailers have been used for about three months and have built a little more than  $2\frac{1}{2}$  miles of road. The road is built of No. 1 and No. 2 crushed rock. As the road-bed is graded, it is covered with No. 1 crushed rock to the proper thickness, and then No. 2 rock is placed on top.



HOLT 10-TON TRACTOR HAULING A TRAIN OF FOUR TROY TRAILERS LOADED WITH ROCK  
This outfit was sold by the Tractor & Machinery Sales Co., Richmond, Va., Geo. E. Hoppe, Pres.

The trailers are loaded by an Erie steam shovel, and instead of the normal  $3\frac{1}{2}$  yards which they are supposed to carry, each trailer is loaded with  $4\frac{1}{2}$  cubic yards of stone. The train is drawn by the tractor over the prepared subgrade to the start of the road and it is claimed that instead of damaging the subgrade, the rolling effect of the wide steel wheels of the trailers actually improves it. The trailers are placed at the right-hand side of the grade, the tractor disconnects and returns to the opposite end of the train, connects up again and begins moving in the direction from which the train has just come, but at a very slow speed. The trainman trips the spreader doors of the trailers, beginning with

the trailer next to the tractor, then opening the following one when the first has discharged its contents. This is continued until the entire train load has been spread in a 6-foot strip at the right-hand side of the grade. The next train load is spread in a like manner on the left-hand side of the grade, and the third train load is spread down the center, thus completing the 18-foot strip and leaving but a trifling amount of hand leveling to be done. The train load with the No. 2 stone is drawn over the spread No. 1 stone at the beginning point, and the operation is repeated until the small aggregate is evenly distributed on the larger. Then it is ready to receive the binder after rolling.

## Excavation and Bridge Construction for C. & O. Railroad

Railroad Yard Improvements at Clifton Forge, Va., Make One of the Largest Pieces of Railroad Construction Now Being Carried on in the South

ONE of the largest, most compact and most interesting pieces of railroad construction now being carried on in the South is the work being done by the Chesapeake & Ohio Railroad in its yards at Clifton Forge, Va. The estimated cost of the work is \$3,500,000. The improvements extend about two miles through Clifton Forge and Selma and involve something more than 2,000,000 cubic yards of excavation, the construction of

three bridges and two changes in the channel of the Jackson River, requiring approximately 1,500,000 cubic yards of material for fills. It is also necessary to make a change about 5,000 feet long in the state highway, including a fill of 100,000 cubic yards and the purchase and wrecking of about 80 residences equally divided between the villages of Clifton Forge and Selma.

The contract for this work was awarded by



GENERAL VIEW OF C. & O. JOB AT CLIFTON FORGE, VA.

The illustration shows the concrete plant operating a 1-cubic-yard Smith mixer, a 180-foot Inaley steel tower, storage piles and bins, an Osgood  $\frac{3}{4}$ -yard heavy-duty shovel, and an Osgood-18 crane. A part of the concrete abutments for the classification yard bridge over the Jackson River is seen in the foreground.





LOADING A TRAIN OF 12½-YARD DUMP-CARS AT THE EAST END OF THE 1,000,000-CUBIC-YARD CLIFTON FORGE, VA., CUT

the C. & O. to the Brooks-Callaway Company, contractors, Atlanta, Ga. The work is being carried on under the direction of C. W. Johns, chief engineer of the C. & O., with E. G. Rice, resident engineer in direct charge. R. M. Brooks is general superintendent in charge of construction for the contractors, and H. A. Deckent, assistant to the general superintendent. The concrete work has been sublet by the Brooks-Callaway Company to W. W. Boxley & Company of Roanoke, Va., who have placed Smith-Towles & Company, a subsidiary company, on the job with complete equipment for handling the more than 40,000 cubic yards of concrete required.

The receiving yard, about 5,000 feet long, will have two main line tracks, a car rider track and ten storage tracks, each with a capacity of 100 cars. The classification yard will be approximately 5,000 feet long, with two main line tracks, a car rider track in the center, and 20 storage or make-up tracks, each with a capacity of 100 cars.

Starting at the eastern end of the classification yards, which is just a little west of the passenger station, begins what is known as the Clifton Forge cut, which has about 1,000,000 cubic yards of excavation. This cut is divided into two parts by the contractors, the eastern end being taken out in one lift with an Osgood-69 steam shovel, while the western end of the cut is being taken out in two lifts by an Osgood-73 steam shovel. The face of this cut will be 73 feet when completed.

At the western end of the Clifton Forge cut runs the Jackson River, which cuts across the yards at this point and makes an interesting problem in the construction of the bridge. The bridge will have two abutments and three piers

of reinforced concrete, on which will be placed the steel girders, and on the girders will be poured a reinforced concrete slab 24 inches thick. The bridge will be 260 feet long and 329 feet wide and will carry the 23 tracks of the classification yard. It is here that the Smith-Towles Company has set up its concrete plant, which will mix and pour 30,000 cubic yards of concrete for this bridge.

Just west of the river comes the Selma or West Clifton Forge cut. This cut has 600,000 yards of excavation and is being taken out in two 25-foot lifts by an Osgood-69 and a Marion-61 steam shovel. The face of the cut will be 50 feet when completed.

Just west of this cut is a 1,000,000-cubic-yard fill, and because of this fill a river change 3,600 feet long which requires 400,000 cubic yards of excavation for the new channel for the Jackson River. As this fill comes in the receiving yards, it is necessary to change the river and fill in the old river bed in order to get ground for the 13 tracks of the yard. On the river change the Brooks-Callaway Company is using a Class-24 Bucyrus dragline machine with a 100-foot boom and a 3½-yard Page dragline bucket. The machine has to dig a channel 3,600 feet long, 100 feet wide across the bottom, with 1:1 slopes and 20 feet deep.

Beyond this fill and river change comes another river change 2,000 feet long, involving 200,000 cubic yards of excavation. Other features of interest on this work are two highway bridges, one an overhead highway bridge of reinforced concrete 300 feet long, which will pass over the yard between the east end of the receiving yard and the hump. There is a county road bridge across the Jackson River.

## Building a Pipe Tunnel Under the Indiana Harbor Canal

New Type of Construction Used by Sinclair Pipe Line Company Avoids Earlier Crossing Difficulties

A NEW application of tunnel construction was made in the recently completed pipe tunnel built for the Sinclair Pipe Line Company at East Chicago, Ind. Heretofore oil transportation lines have been laid in the beds of streams, either through dredged channels or directly on the bottom, and held in place with heavy cast-iron river clamps. The oil companies have had a great deal of trouble with these lines through the action of the water on the lines and the changes on account of dredging and cleaning out the bottom of the streams. Furthermore, breaks in the lines at the river crossing have compelled the abandonment of old lines and the construction of new ones. By building this tunnel to take care of the lines they are at all times subject to inspection and can be very easily replaced at small expense.

The crossing under the Indiana Harbor Canal near White Oak Avenue, East Chicago, Ind., takes the form of an inverted siphon, which carries the pipe lines from the Wyoming, Kansas and Oklahoma oil fields to the refineries at Whiting and East Chicago, Ind. The siphon is designed to carry two 12-inch and two 8-inch lines.

The arch top tunnel measures 7 by 7 feet,

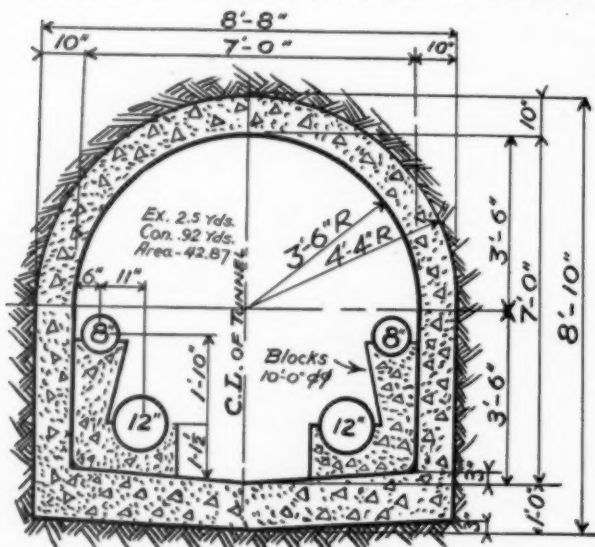
with a short section measuring 10 by 10 feet near the north shaft, which facilitates the hauling and assembling of the pipes. Entrance to the tunnel is by two 10-foot-diameter, concrete-lined shafts about 65 feet deep.

### Excavation and Construction of Shafts

All of the excavation for the tunnel was taken out of the south shaft and piled nearby and will be used as a top covering for the fire-walls of the adjacent tank farm. The shafts were 13 feet outside diameter and 10 feet inside the concrete lining. The first 25 feet of excavation for the shafts was through a very fine water-bearing sand with a few thin layers of fine gravel. On the south shaft the next 10 feet of excavation was through a tough, soft clay containing a few small stones, but on the north shaft the excavation was different, as the south half of the shaft was through a very hard, tough clay, while the north half was about 5 feet through a black mud in which several red cedar logs were found. The remainder of the shafts was tough clay containing a large percentage of small pieces of stone and slate. Little water was found after the shafts were sunk a distance of 10 feet in the clay.

Wood sectional forms in 4-foot sections were used in forming the concrete shell. A cutting edge made of an angle 4- by 4- by  $\frac{1}{2}$ -inch and a 24- by  $\frac{3}{16}$ -inch plate, with  $\frac{3}{4}$ - by 36-inch bolts spaced about 25 inches apart, was used on both shafts. The concrete was reinforced with  $\frac{1}{2}$ -inch square steel bars, 24 inches apart, both horizontal and vertical.

The construction equipment for the south shaft consisted of a traveling crane with a 40-foot boom for handling a  $\frac{1}{2}$ -yard clam-shell bucket operated by a 7- by 10-inch steam hoisting engine. Air or the pneumatic shovel used in the excavating work and for the ventilation of the tunnel was supplied by a 10- by 10-inch steam air compressor with a 60-inch by 6-foot air receiver. Steam for the com-



SECTION OF PIPE TUNNEL, SHOWING LOCATION OF VARIOUS PIPES AND METHOD OF CARRYING THEM



CONCRETING ARRANGEMENT, SHOWING MIXER, INDUSTRIAL TRACKS AND ELEVATOR

pressor was supplied from the hoisting engine. Water for the boilers and concrete work was supplied by a 2-inch gasoline pump connected to a system of well points. Concrete was mixed in a  $\frac{1}{4}$ -yard gasoline mixer and placed in the forms with a bottom-dump bucket. The equipment for the north shaft consisted of a 60-foot mast guy derrick with a 50-foot boom for handling a  $\frac{1}{2}$ -yard clam-shell bucket, and was operated by an 8- by 10-inch steam hoisting engine. The concrete was mixed in a  $\frac{1}{4}$ -yard gasoline mixer and placed in the forms by a bottom-dump bucket. Water for the north shaft was supplied from the south shaft through a  $1\frac{1}{2}$ -inch pipe laid across on the bottom of the canal.

The shafts were sunk by the open dredging method to near the top of the tunnel and were then underpinned from that point to the bottom. Several small "wash-ins" occurred in both shafts, caused by sticks and flat stones getting under the cutting edge and cutting a small channel on the outside of the shell. Two sets of forms were used on each shaft, and forms were left in place about 24 hours. A steel ladder extending from the bottom to the top was placed in each shaft for use in entering the tunnel.

#### Tunneling

Tunnel excavation was handled from the south shaft and was nearly all in tough clay containing sticks and small stones. In this material the ordinary method was to mine and concrete 6 feet in a 9-hour shift, and as two shifts were operated, the daily progress was 12 feet. A few small sand pockets were encountered, and where these occurred, mining, timbering and concreting was done in 3-foot sections. Three pneumatic shovels were used in the heading, operated by three miners, and the muck was handled by two car pushers and two muckers on each shift.

Steel ribs made of two pieces of 6-inch channel with angle lugs at top and bottom for bolting together and 2- by 6-inch wood lagging with beveled edges were used for the forms for the concrete lining of the tunnel. The excavated material was handled in  $\frac{1}{2}$ -yard steel, V-shaped side-dump cars on a track of 16-pound rail of 14-inch gage resting on 4- by 4- by 36-inch wood ties spaced 30 inches apart. The cars were handled on a 5- by 4-foot elevator operated by a steam hoist.

Gravel concrete of a 1:2 $\frac{1}{2}$ :4 mix was used for all of the work. The concrete for the tunnel was handled by the  $\frac{1}{2}$ -yard steel cars and then shoveled and tamped into the forms. A medium mix was used. Concrete inserts for pipe rests were spaced 10 feet apart in the tunnel and shafts to provide for future pipes. Four lines of pipes were placed in the tunnel and shafts. All of the pipe in the tunnel was welded in place on the pipe rests.

A small steel building resting on concrete foundations was built near the south shaft to house the valves and header pipes of the different pipe lines. An electric pump will be installed to take care of any leaks that may occur in the lines. At the present time there is no seepage of water through the walls of the shafts or tunnels and there is a very strong current of air passing through the tunnel.

Lines for the tunnel construction were established by the contractor with heavy plumb bobs suspended in the shafts, and lines and grades were run by the contractor. The work was commenced on June 16 and the tunnel was holed through on September 16. The estimated cost of the work was \$100,000.

#### Equipment Used in Tunnel Construction

The traveling derrick used in the work is made by the Wiley Company, Dayton, Ohio, and is operated by an American 7 by 10 hoist,

the swinger being operated by a No. 3½ Dake engine. The American guy derrick is operated by a Lambert 8¼- by 10-inch DC DD hoist. Atlas half-yard cars were used for handling materials and concrete. The mixer at the south shaft was a 10S Koehring, and at the north shaft a 10-S Marsh-Capron. The pneumatic shovels were made by Ingersoll-Rand and the Chicago Pneumatic Tool Company. The gasoline 2-inch force pump was made by the

Domestic Engine Company, and the air compressor is a Laidlaw-Dunn-Gordon. A Kiesler half-yard clam-shell bucket was used on the south shaft, and an Owen half-yard clam-shell on the north shaft. The concrete bucket was a Stuebner.

The siphon was designed and constructed by the Subway Engineering Company of Chicago, Ill., for the Sinclair Pipe Line Company of Tulsa, Okla.

## What More Can a Contractor Do?

**Automobile Drivers Seem Bound to Disregard Safety Barriers Placed by Contractors**

**D**ISREGARD of danger signs, red lights and warning signals by the drivers of high-powered cars, even disregard of barricades, where contractors close a road for construction or a bridge for repairs, is the cause of numerous accidents on state highways, according to John D. Williams, Director of the Highway Commission, Indianapolis, Ind. Mr. Williams cites a recent accident on the Boot Jack or State Road No. 25 in the vicinity of Michigan City, where a Chicago car occupied by six people crashed through a barricade at a bridge, passed danger signs and red lights and plunged onto the bridge, from which the floor had been removed, to leap in a nose dive to the stream-bed below. Fortunately, and strange to say, no one was seriously hurt.

The contractor had removed the bridge floor, built a runaround to care for traffic, and was preparing to raze the old bridge to supplant it with a modern structure. At the last cross-roads near the bridge a "Stop" sign had been erected, and near the bridge a barricade had been constructed from which red lights were displayed. As a last precaution, an 8-inch steel

channel was wired across the end of the bridge. In spite of these warning signs and barricades the auto was driven onto the bridge, slid across the joists of the first span, across the middle pier, and plunged through the second span.

Another instance of the disregard of barricades, though less spectacular, was seen on the construction of Route 3 of the New York State Highway in South Nyack, N. Y., recently. The contractor had finished a good strip of road and the earth cover had been placed upon it, with a barricade across the entire width of the road with red lights suspended from it. An automobilist came down the completed portion of the road above, carefully removed a portion of the barricade, drove his car in onto the new concrete and replaced the barricade. His only satisfaction could have been the deep imprint of his non-skid tires in the fresh concrete.

It may be necessary before long to have watchmen with the famous Doughboy sawed-off shotgun to guard the barriers and prevent reckless or willful drivers from damaging themselves or recently completed work.

## The "Idea Carrier"

**Contractors Will Do Well to Consider Carefully the Constructive Suggestions of Salesmen**

**A**MAN who travels much can't help absorbing a lot of ideas. He sees things and hears things that it would be worth a good deal of money for other men to know, but which, as they do not travel much, they will very likely never hear of unless some salesman calls upon them and tells them. That is why the really big men in the contracting industry—in fact, in every line of business—are willing to give most salesmen a hearing.

Let's narrow this down to the contractor; if he is alert and progressive he is always looking for new ideas, short cuts, new methods, more efficient ways of doing things. Such a man realizes that wide-awake salesmen who spend the greater part of every year calling on contractors great and small cannot help picking up a lot of valuable ideas and information. This information they are always glad to pass on to men who can use it, but how can they do so unless the men on whom they call are willing

to grant them a few minutes of their time?

It will pay not only every contractor, but every user of material-handling machinery, to "be human" with the salesmen who call on him. Primarily, of course, they are there to make a sale or lay the foundation for one, but they realize that their success in doing so depends entirely upon the help they can give their prospect and the service they can render, and if they have picked up an idea that they think will help they are only too glad to pass it along if given a chance to do so.

Ideas are the source of all progress. They are priceless. The traveling salesman is an "idea carrier." He cannot help being "infected" with ideas as he goes about. The man who refuses to see the salesmen who call upon him or grudgingly gives them a chilly two minutes or so, inoculates himself against ideas which might mean a whole lot of money to him.

—The American Bulletin.

## Manufacturers ---- Distributors ---- Consumers

Published under the auspices of the Associated Equipment  
Distributors, Sixteenth Street Viaduct, Milwaukee, Wisconsin

### Select the Plant Before Bidding the Job

By M. R. Hunter

President, Hunter Machinery Company, Milwaukee, Wis.

**“W**HY read further than the title?” I can hear the average contractor say. “Haven’t I run actual jobs dozens of times? What I want to know after I get my job is, your price and how quick you can deliver. Right now I’m too busy to talk equipment.”

Now, the average contractor having this thought is both right and wrong, depending on whether he is talking to an equipment salesman who does not know his business, or to one who does. If the salesman is above the average, has passed through his apprenticeship, and is well versed in the fundamentals of mechanical sales and the use of construction equipment, he should have your confidence and should be able to be of value in helping you select equipment.

It is to be assumed that the salesman of construction equipment should have, first, a complete knowledge of what he is selling; second, a very thorough and accurate understanding of competition; third, an understanding of the actual and variable application of his equipment in field service, so that the equipment he recommends will be sound, practical and economical in service. In other words, in the investigation of plant equipment the contractor should follow two ideas: first, test and use the knowledge of the salesman, if it is sound, thereby placing himself in a position to secure the benefit of this knowledge and field experience; the other course is for the contractor to ignore the mental capacity and possible usefulness of the salesman and follow his own inclination. Accepting the first course, the contractor has everything to gain and nothing to lose; following the second, the contractor never knows but that he has missed the opportunity of capitalizing on the salesman’s experience. It is the aim of the Associated Equipment Distributor to place only men in the field who are of a high caliber mentally and can be depended upon.

The 1923 construction season has practically reached its close. Few road builders or building contractors are ever extremely busy during December and January or March. Why not take time by the “forelock” and conserve money and labor by a most careful and thorough study of every make of competitive and non-competitive machinery, at the same time making a thorough analysis of every method of performing a given piece of work, comparing it with the way the work has been done in the past,

thus determining in this simple research work whether future problems can be more economically solved by new methods than by past known practise? We urgently request the contractor searching the market through his local distributor for machinery, equipment and tools which will increase his profits, to review the past season’s work; recall operations that were costly or mistakes that were made, and take steps to make the future choice of equipment for the next job along lines that will be non-experimental, more practical, and in line with expected development.

#### Is Your Plant Well-balanced?

The “curse” of the average contractor, as I see it after twelve years’ insight into equipment problems of every nature, is that many contractors’ plants are hopelessly “lopsided” and unbalanced and represent a hybrid collection of purchases made mostly under emergency conditions. This is brought about through the contractor’s failure to anticipate far enough in advance, which more or less forces him to buy on the spur of the moment for his immediate need. The fact cannot be overlooked that the proper balance of a contractor’s equipment is a most valuable asset.

Last spring a contractor that I know found it urgently necessary to raise a certain sum quickly. His bankers, in considering his assets, severely discounted their value, admitting them only at a small percentage of the invested or actual worth. This brought the thought to my mind that greater cooperation between the contractor and the distributor in selecting dependable plant equipment can be the means of directly increasing the value of his equipment, not only to his banker, but in performing every duty on the job. Every contractor is entitled to a fair opportunity of realizing an equitable amount on his equipment when necessary, so it is my opinion that the fair appraisal of a contractor’s equipment can best be insured by buying right in the beginning. Thus the contractor who forgets or arbitrarily refuses to discuss with the distributor his existing plant when purchasing new equipment is missing a big “bet” and an opportunity of thoroughly testing the knowledge and capability of the man soliciting his business, and capitalizing on his experiences.



### What Kind of Power?

One of the details involved in the balance of a plant is the question of power. Which shall it be—gasoline, steam, electric or compressed air? In each field you meet men of sound convictions. One or another is right. Each has its place, and each is best under certain conditions. In choosing the kind of power, the future should be thoughtfully anticipated so that, not only on the job you have at present, but on the next job, will this piece of machinery be more adaptable and more versatile than another that you might be tempted to purchase in the grand rush when the contract is awarded.

If your distributor is a real "live wire," knows his work and his duties, and can substantiate his claim for service, he unquestionably can save you considerable, possibly in converting that part of your existing plant, now temporarily obsolete, into a more practical unit and increasing its potential value. Right at this point, do not forget in making your next purchase to consider whether what you are being offered is flexible enough to be reconverted later if necessary. This is particularly true of mixers, hoists, pumps, compressors, batchers, etc.

### Capacity and Mobility

The question of proper design and capacity of a plant is largely governed by the magnitude not only of your average work, but of what you consider you are likely to tackle in your future work. Here, experience and plenty of it is needed, for on asking for a different size in a particular unit hinges one of your big chances for a little "clover" or real profit, or a loss on the particular job you have in mind. Every contractor should endeavor to secure equipment of corresponding value and strength and proportional in size, and in this he can exercise fine judgment, if he will, in anticipating future needs. We may illustrate it by suggesting that on one job a contractor might buy a 1-bag or a 10-foot mixer. He might require a hoist to elevate the entire batch. We will say that there are two possible sizes of hoists that he could buy with economy and good judgment—one size that will just do the work, and a little larger size which would a little more than do the work at only a small proportional difference in cost. The choice of the less expensive but smaller outfit on the first job might be found useless on the next job when a two-platform elevator was wanted, thus forcing the contractor into a duplicate purchase of a similar plant with only a slightly larger capacity at a very much greater outlay than he would have made in the first instance by considering all these elements of future needs. I know of a number of cases in road work and general contracting, under almost identical climatic, soil, labor and price conditions, where a contractor with a smaller-size investment made far more in the aggregate than the man who plunged into the large-capacity equipment, and vice versa.

Another item that should have the contractor's serious thought and planning for his work

is the mobility of his equipment. This is something tangible which he can calculate on, as he has been on the job and knows just how far it is from the railroad station or from a point from which he must move his materials. Here is another opportunity for the contractor to carefully adjudge the value of a plant and to buy those units which are mobile and portable and can be moved and handled with a minimum of expense, for many dollars can be clipped off a bid by careful planning of this nature.

Another element that enters into his profit-taking is the movement of his machinery. Many contractors will take an expensive paver, crane or other heavy unit and attempt to move it 10 to 50 miles under its own power, not realizing that they are deducting from its efficiency and life, when by the purchase of an auxiliary truck or trailer they could conserve it and increase its life one or two years. Every additional year that you can make a piece of machinery serve faithfully is money in your pocket and means a lower bid on each successive job.

Workmanship and design in a machine are worth studying, for a fine theory or idea is not worth much to a contractor if it is poorly executed and carelessly built. Simplicity, man—seek it and "hug it tight," for fewer parts mean less replacements and things to get out of order, break and require adjusting.

### The Value of the Reliable Distributor

Materials, design and workmanship that are used and employed in the building of construction equipment mean hundreds, yes, thousands, of dollars to you in the course of your work. The only man who is in a real position to tell you about this and to do it advisedly and conscientiously is the reliable distributor, and his salesmen will know. They have made it their business to know, and no man can survive this business who does not know. Is it cast iron that is used where malleable iron or steel is needed? Or bolts where rivets are "begging for admission"? Do they use set screws where a key seat is better? Do manufacturers give too much prominence to the merchandising end of a job and put a 3-h.p. engine where a 4 is none too much, or a thin sheet of metal where boiler plate is demanded? There are hundreds of other details, which cannot escape the distributor. It is a story that does not show in a photograph of the machine, and it is to you and your distributor to work in harmony and to get together on every individual problem you have, because you are the one to suffer real loss in ill-advisedly buying the wrong equipment.

All of these questions are involved in the problem of dependability, and the answer to it is—be sure that the manufacturer in attempting to secure some particular feature in his design, such as excessive capacity or portability or weight, has not exceeded the proper speed, has not adopted a wrong method of drive, or made an ill-advised choice of frictions, material, or clutches. Find out by contact with your distributor and his organization whether they know these things and if you can place confidence in them in using their services. You

**A WELCOME APPRECIATION**  
Many expressions of appreciation of the series of articles appearing in **CONTRACTORS' & ENGINEERS' MONTHLY** under the auspices of the Associated Equipment Distributors have come to us, but none more welcome nor whole-hearted than that which it is our privilege to print below from the members of the Associated Equipment Distributors themselves.

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November 9th 1923.

Contractors' & Engineers' Monthly,  
443 Fourth Avenue,  
New York City.

Gentlemen:

The Associated Equipment Distributors, individually and as a body, desire at this time to express their appreciation to the Contractors' & Engineers' Monthly for their interest in promoting these articles, under this Department, and to extend to them and the Trade our heartiest and most sincere Christmas and New Year Greetings, wishing them in their many respective fields a greater success for 1924.

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By *MR. Hunter*

have nothing to lose and everything to gain. Mutual cooperation may mean the saving to you of an important contract when you least expect it. Down East recently on a sewer job of \$36,000 there was a discrepancy of \$250 between the two lowest bids. The unfortunate "also ran" was feeling pretty blue when one of our A.E.D. members met him. Discussing the job for five minutes brought out the fact that the contractor, if he had previously consulted with the distributor's sales engineer, could, with an expenditure of less than the difference between the two bids, have effected a saving of over \$600 and landed the contract.

In conclusion, as an opportunity to do what this article urges, do not forget the Road Show at Chicago, to be held at the Coliseum, January 14 to 18. Your failure to attend this will cost you money. The Show represents the most attractive display of labor-saving construction equipment in the world. Here, at your leisure, you can carefully study all these competitive exhibits, make notes, discuss the "pro" and "con" with those in charge of the exhibits,

see them in actual service side by side, and prepare for next spring and the eventual job. Look up your local distributor who will attend this convention, and arrange to let him pilot you through the exhibits. It will save your time and energy. You will have opportunities of making direct comparisons here of all competitive machines and picking the good from the bad and the indifferent from the worse.

The Associated Equipment Distributors hold their annual meeting on Friday and Saturday prior to the Chicago Road Show. At this meeting a member of the Associated General Contractors will speak. Many contractors and equipment manufacturers will gather in Milwaukee on this date. Those interested are welcome to attend the meeting on Saturday, which is an open one, where the interests of the manufacturer, contractor and distributor are widely discussed. In other words, it is a gathering of the "Clan."

EDITORIAL NOTE.—Do not fail to read the January article, which will be of interest to all contractors and will be edited by J. S. Beckwith, President of the Beckwith Machinery Company, of Pittsburgh, Pa.



VIEW OF COMPLETE EXTENDED SAND AND GRAVEL PLANT, PEKIN, ILL.

## An Interesting Group of Sand- and Gravel-Washing Plants

The McGrath Sand and Gravel Company, Lincoln, Ill., Has Kept Pace with the Demand of Illinois, Wisconsin and Indiana for Clean Sand and Gravel

By E. E. Pierson

TO meet the requirements of modern concrete construction, sand and gravel must be thoroughly washed and screened. The preparation of washed sand and gravel becomes a highly efficient factory plant process in which millions of dollars are invested. This industry in Illinois has enjoyed a rapid growth in the past decade, keeping pace with the wonderful development of concrete construction. Fifteen years ago, when construction was in its infancy, comparatively speaking, the product used was largely supplied from local creeks and banks. It was originally believed that any kind of sand and gravel would answer for the manufacture of concrete. Both were used in the early days regardless of quality and cleanliness, resulting in unsatisfactory concrete construction. Tests made by those interested proved that the fault lay chiefly in the presence of dirt, loam, clay and other foreign matter in the sand and

gravel, which prevented the cement from properly performing its function. The demand for clean, washed material made it necessary for the producers of sand and gravel to wash and clean their products to meet the rigid specifications drawn by engineers and architects.

The campaign for hard roads in Illinois and other states has also greatly increased the demand for cement and washed sand and gravel. Further, the demand for sand and gravel during the winter months is rapidly increasing, due largely to the demonstration that concreting in cold weather is entirely practicable.

The McGrath Sand and Gravel Company of Lincoln, Ill., has standardized its operations to promote efficiency and economical operation. The business, launched 16 years ago, has grown to a half-million-dollar investment in five modern plants which have a combined capacity of 180 car-loads per day, making this one of the

largest institutions of its kind in the Middle West. The general offices are maintained at Lincoln, and the main plants are located at Joliet, Forreston, Pekin, Mackinaw, and Chillicothe, all in Illinois. The bulk of the shipments go to Illinois, Wisconsin and Indiana. Although operating in various forms of deposits, these plants are nearly identical in their main aspects.

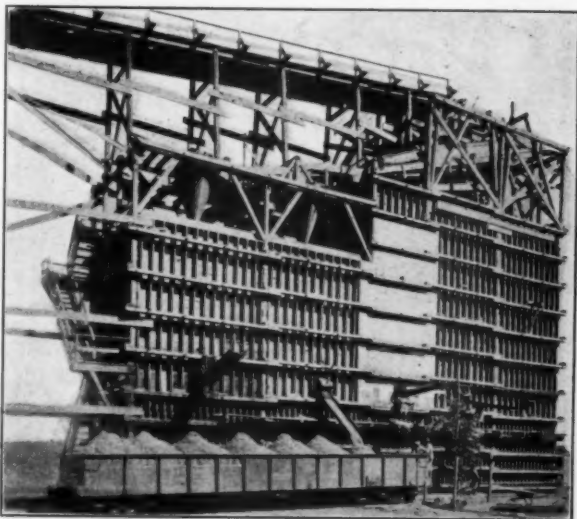
#### Pekin and Mackinaw Plants

For the removal of deposits in the vicinity of Pekin and Mackinaw, which are mainly composed of sand, and also for the handling of coarser products of gravel in the northern section, the company operates 1¼-yard Sauerman buckets on cableways. A 500-foot radius is the usual limit of operation of the buckets at these plants. Originally the McGrath Company operated the buckets from masts which were mounted upon the main plants. Then belt conveyors were installed when the deposits became exhausted, the buckets working into a storage bin from which the raw material was fed upon a belt conveyor. In the plants at Forreston, Joliet and Chillicothe, the company has found it more expedient to construct and use the conveyor system at the outset, and these plants were built with this detail in view.

For several years the plants have been operated by electric hoists manufactured by the Thomas Elevator Company, of Chicago, and all of the plants are equipped with Link-Belt screens, sand separators, chutes and conveyor idlers, operated by U. S. Rubber Company belting.

The operations of the McGrath Company have been so successfully standardized that the parts from various plants are frequently moved from one plant to another as operating conditions make it desirable or necessary. This interchangeable feature of equipment is regarded as important from the standpoint of economy.

During the last year the plant at Pekin was supplied with a second conveyor, bucket and hoist in order to permit it to operate in two areas simultaneously. As the deposit in Pekin is rather fine, the screening and washing plant has no difficulty in handling the output of both conveyors. A second conveyor is now being installed at the Chillicothe plant to increase the daily output by 25 to 50 cars per day. McMyler locomotive cranes are used at the various plants among the other labor-saving devices, all of which have been installed to



THE SAND AND GRAVEL WASHER AT THE McGRATH PEKIN PLANT

insure the maximum of output and efficiency with the minimum of expense. To meet the great demand for material, it has been found expedient at times to continue excavating after the washing plant has suspended operations for the day, filling the steel storage bins and running the materials through the plant as soon as operations begin the following morning.

The first McGrath washing plant was installed in 1912 at Mackinaw and it was the first gravel-washing plant in the United States to use dragline excavators with a rotary washing screen equipment. The plant at Chillicothe followed in 1914, and that at Pekin in 1917. The Forreston plant was put into operation the following year, and the plant at Joliet started in 1921. These five plants are so located, from the geographical standpoint, that shipments can be made in quick time and with short hauls to various states of the Middle West, thus lessening freight charges. In order to take care of the winter demand for sand and gravel, the McGrath Company has erected large storage buildings which make it possible to keep all the plants in continuous operation and thereby furnish their employees with work for the major portion of the year.

The nucleus of the McGrath Company is three brothers—J. W. McGrath, in charge of the operation of the various plants, T. E. McGrath, who has charge of sales and traffic, and T. P. McGrath, who has charge of auditing and accounts. During the last year the company produced 1,000,000 tons of sand and gravel, an average of 200,000 tons per plant, or a total of 20,000 car-loads based on an average of 50 tons per car.

# Catalogs Worth Securing

The catalogs and pamphlets listed below are available for free distribution. Contractors and Engineers who check over these pages each month and write for such material as interests them, will find this a valuable means of keeping up to date on the subject of machinery and equipment.

## SCARIFYING WITH MOTOR ROLLERS

Catalog F, published by the Austin-Western Road Machinery Co., describes the Austin motor roller and tells of the experience of thousands of contractors and road officials with this type of roller for scarifying and general road work.

## DIET-MOVING WITH A SMALL GANG

Baker-Maney self-loading scrapers make it possible for the contractor to handle a big grading job with only a small gang. How this is possible is told in catalog 96-A, which may be secured from the Baker Mfg. Co., 285 Stanford Ave., Springfield, Ill.

## INDUSTRIAL RAILWAY EQUIPMENT

Contractors' square box dump-cars, road builders' trucks and batch boxes and complete industrial railway equipment are described in the literature of the Koppel Industrial Car & Equipment Co., Koppel, Pa.

## MOTOR AND STEAM ROAD ROLLERS

Contractors wishing information regarding Gallion motor or steam rollers, furnished with or without pneumatic scarifier attachment, may secure complete information by writing to the Gallion Iron Works and Mfg. Co., Gallion, Ohio.

## CONCRETE DRILLING TOOLS

Contractors in need of a pneumatic tool for drilling holes and cutting ducts in concrete should secure the bulletins describing the Baby Plugger made by The Dallett Co., Philadelphia, Pa.

## SPECIFICATIONS FOR LIME PLASTER

Bulletin 305-A, recently issued by the National Lime Assoc., Washington, D. C., contains complete standard specifications for the preparation and use of lime plaster on all types of backings. The bulletin also contains short form specifications and definitions and notes with reference to several sections of the standard specifications.

## ADEQUATE STREET CLEANING

Contractors and officials interested in the question of street cleaning should secure the literature of the Municipal Supply Co., South Bend, Ind., describing South Bend "Studebaker model" street flushers and sprinklers, which are mounted on 5-ton motor trucks with independent motor-driven pumps to provide adequate water pressure for flushing purposes.

## INDUSTRIAL LOCOMOTIVE FROM TRACTOR

A complete attachment for a Fordson tractor which in three hours will make it into an industrial locomotive, capable of handling practically all contracting work in that line, is described in the literature of the Adamson Motor Co., Birmingham, Ala.

## DATA ON OXYACETYLENE WELDING

Readers of Contractors' & Engineers' Monthly who are particularly interested in the application of oxyacetylene welding to the contracting industry may secure the interesting monthly publication "Oxy-Acetylene Tips" without charge by writing to the Linde Air Products Co., 30 E. 42nd St., New York City.

## TRACTORS FOR ROAD BUILDING

The O. L. Best Tractor Co., San Leandro, Calif., has a very interesting book, which not only tells why contractors are getting such good work out of Bests in road building and maintenance, but also tells a lot about the use of these tractors for snow removal in progressive cities and counties.

## EXPANSION JOINTS FOR CONCRETE BRIDGES

Contractors will do well to look into the advantages of Carey Elastite expansion joints for use on concrete bridges and viaducts. Complete literature and information may be secured from the Philip Carey Co., 9 Wayne Ave., Lockland, Cincinnati, Ohio.

## A COMPLETE BOOK ON METAL LATH

The Truscon Steel Co., Detroit, Mich., has just brought out a remarkable book entitled "The Truscon Metal Lath Data Book," which contains specifications, details, tables and practical information on metal lath construction. The pages of architectural details are prepared from practical experience in the field, and the specifications used throughout are adapted from those compiled by the principal metal lath manufacturers, with the cooperation of the American Specification Institute.

## IMPROVED ROCK DRILLS

In its literature, the Wood Drill Works, 30-36 Dale Ave., Paterson, N. J., describes the development of Wood rock drills since 1891 and outlines their accomplishments in detail.

## PUBLICATION ON GASOLINE POWER

The Domestic Engine and Pump Co., Shippensburg, Pa., has just begun the publication of a small magazine, "Gasoline Power," which it will be pleased to send without charge to any contractors interested in the use of gasoline engines in any type of contracting machinery, or as power units for hoists, draglines and other construction units.

## VACUUM CLEANING DATA

Architects, building contractors and engineers will be interested in the Fifth Edition of the 20-page booklet issued by the United Electric Company, Canton, Ohio, entitled "Vacuum Cleaning Data for Architects and Engineers."

## CONCRETE-PLACING EQUIPMENT

Catalog No. 44, which contractors may secure gratis from the Insley Manufacturing Co., Indianapolis, Ind., describes with appropriate illustrations and diagrams the Insley quick-shift steel tower, counter-weight chute plant and mast hoist bucket plant, together with the details of their hoists, buckets, chutes, hoppers, booms, sheaves, carts, cars and skips.

## TURNABLES FOR MOTOR TRUCKS

The Freeman Mfg. Co., Racine, Wis., makes a turntable which is mounted high enough to clear the forms, will handle all kinds of trucks, occupies only 6½ feet of road, and is very easy to turn.

## CENTRIFUGAL PUMPS FOR CONTRACTORS

Bulletin No. 25, issued by the Barnes Mfg. Co., Mansfield, Ohio, describes the new Barnes-215 centrifugal pump with four-cylinder engine particularly adapted for gravel washing, irrigating, drainage work, quarry pumping and draining clay pits in brick plants. It is also adaptable to contractors' use where large volumes of water must be handled quickly.

## CRUSHING AND ROAD-BUILDING MACHINERY

Catalog M. A. U., just issued by the Good Roads Machinery Co., Inc., Kennett Square, Pa., is a 36-page, well-illustrated text-book describing Climax rock crushers, elevators, screens, conveyors, portable stone bins, elevator feeders, bin gates and chutes for highway construction, both for city and county departments and for road contractors.



**AN AIR-COOLED MULTI-PURPOSE GAS ENGINE**

An air-cooled gasoline engine which is never troubled with freezing, over-heating or water troubles and which operates on gasoline or kerosene and is built in sizes from 2 to 5 horse-power, with an automatic throttling governor, is described in detail in the literature of the New-Way Motor Company, Lansing, Mich.

**CORE DRILLS IN SERVICE**

Bulletin No. 34, just issued by the McKiernan-Terry Drill Co., 19 Park Row, New York City, contains a great deal of information regarding core drills for determining positively the formation beneath proposed locations of bridges, dams, piers, canal locks, large buildings and other heavy construction.

**A COMPLETE LINE OF PUMPING OUTFITS**

The Novo Engine Co., Lansing, Mich., has just issued a brand-new Bulletin, No. 143, which fully illustrates and describes the complete line of Novo pumping outfits for various kinds of contracting jobs.

**METAL LUMBER**

In Bulletin No. 12-A, the Berger Manufacturing Co., Canton, Ohio, describes in detail Berloy metal lumber, which is strong, fire-proof, permanent and of light weight and is particularly adapted for all classes of buildings in which people live and work, such as homes, schools, churches, banks, hospitals, apartments and modern office buildings.

**LIME AND LIME CEMENT BRICK MORTAR**

The most recent publication of the National Lime Association, 918 G Street, N. W., Washington, D. C., Bulletin 300-A, "Lime and Lime Cement Brick Mortar," has been prepared in response to repeated requests for a short and easily read booklet on the properties of lime in mortar. This booklet gives the essential features of mortar in the walls, cohesive, adhesive and compressive strengths, water tightness and economy.

**ROAD PLANERS, GRADERS AND DRAGS**

A complete line of effective road machinery for contractors' use, including road planers, graders and drags, is described in the illustrated catalog of N. S. Monroe & Sons, Arthur, Ill.

**PORTABLE CAR UNLOADERS**

The Universal Road Machinery Co., Kingston, N. Y., claims that the Reliance portable car unloader for handling crushed stone, sand or gravel from gondola cars to bins or trucks will save more than its cost in one season. An illustrated catalog describes the machine in detail.

**A PUMP FOR EVERY SERVICE**

The catalog of the Aldrich Pump Co., Front & Gordon Sts., Allentown, Pa., describes all types of Aldrich pumps and should interest contractors, particularly in solving unusual pumping problems on construction jobs.

**A DUMP-QUICK BODY FOR FORDS**

Bulletin 130, just issued by the Heil Co., 1243 26th St., Milwaukee, Wis., describes the new "Dump-Quick" platform gravity body, which is particularly suited for road and building contractors in hauling sand, gravel, earth, crushed stone, etc.

**THE VALUE OF POWER DRAG SCRAPERS**

Contractors, owners of small gravel pits, and county officials have shown great interest in the Sauerman Junior power drag scraper outfit, which is inexpensive and easily moved from place to place. Complete literature and a copy of Sauerman News may be secured free by any interested contractor or official writing to Sauerman Bros., 464 S. Clinton St., Chicago, Ill.

**BIG YARDAGE FROM SMALL MIXERS**

A yardage of from 120 to 150 cubic yards in 10 hours with an Atlas one-bag mixer, is average performance. A complete description of this line of mixers, made in 3/4-foot, 1/2-bag, 1-bag and 2-bag sizes, may be secured from the Atlas Engineering Co., 3036 Galena St., Milwaukee, Wis.

**COMPLETE CHUTING PLANTS**

The use of complete Ransome equipment on concrete chuting jobs, including mixers and chuting plants, has distinct advantages, which are told in the literature of the Ransome Concrete Machinery Co., 1772 Second St., Dunellen, N. J.

**TRACTORS THAT FINISH THE JOB**

You don't want a tractor that will "lay down" when the work becomes hard. Just how Holt Caterpillar tractors stand up on heavy contracting jobs is told in an interesting manner in the literature of the Holt Mfg. Co., Inc., Peoria, Ill.

**CONQUERING ROADWAY DUST**

In a booklet, "Conquering a Common Enemy—Dust," the Carbondale Calcium Co., Carbondale, Pa., describes the use of Carbondale calcium chloride for eliminating the dust nuisance on earth, sand, clay, macadam and gravel roads and also in speeding up the curing of concrete.

**STEEL PIPE FOR WATER-MAINS**

The National Tube Company, Pittsburgh, Pa., has issued a well-illustrated, 64-page catalog of National Matheson joint steel pipe, describing its use for long flow-lines, city supply mains, high-pressure fire protection hydro-electric and irrigation developments and certain types of drainage, as well as for gas-mains, dredge lines and other contracting and engineering uses.

**ACCURATE STEEL TAPES**

Contractors and engineers cannot afford to use a woven tape which stretches and gives erroneous measurements. The price and value of Lufkin "Banner" steel tapes are told in the literature of the Lufkin Rule Co., Saginaw, Mich.

**CONVEYING BELTS FOR MATERIAL HANDLING**

Conveying belts and feeder gates that are rugged in construction and low in price are described in the literature of the Robins Conveying Belt Co., New York City.

**BETTER BONDS IN ASPHALT REPAIRS**

The Improved Equitable asphalt heater makes possible the proper bonding of old and new asphalt by heating 45 square feet of pavement in from one to two minutes. This machine is described in the specifications of the Equitable Asphalt Maintenance Co., 1901 Campbell St., Kansas City, Mo.

**SAFEGUARDING YOUR REPUTATION**

The latest literature of the Texas Co., Asphalt Sales Dept., 17 Battery Pl., New York City, tells how a contractor can safeguard his reputation through using Texaco asphalt in building all types of bituminous pavements.

**ENGINES THAT DON'T LOAF**

The Climax engine is said to set the pace on every construction job and for every machine on which it is installed. Nothing encourages loafing on a job so much as an engine that loafs, and so it is well to install one that will stand up under all conditions. The catalog of the Climax Engineering Co., 1 West 18th St., Clinton, Iowa, describes in detail the Climax, "The Trustworthy Engine."

**CONVERTIBLE STEAM SHOVELS**

Steam shovels that are convertible to service with skimmer, ditcher and clam-shell buckets for road grading, trenching, backfilling, cellar digging, loading, unloading and handling materials are described in the literature of the Keystone Driller Co., Beaver Falls, Pa.

**A HAND HOIST FOR MOTOR TRUCKS**

The Rock hand hoist, a well-designed and carefully built hoist for dump bodies up to 3 1/2 tons capacity, is described in the literature of the Rock Mfg. Co., Waterloo, N. Y.

**CULVERTS THAT RESIST BUST**

Newport culvert pipe of round, riveted, full-circle construction is said to be the strongest corrugated metal culvert manufactured. The same material goes into the well-known half-round, flat-bottom culvert pipe also made by the Newport Culvert Co., 542 West 10th St., Newport, Ky., and both are described in the free literature issued by this company.

**SATISFACTORY BITUMINOUS DISTRIBUTORS**

The motor-driven asphalt and tar distributors made by the Kinney Mfg. Co., 3529 Washington St., Boston, Mass., have made money for many contractors, because of their satisfactory service and easily controlled nozzle equipment.

**STERILIZED WATER IS SAFE WATER**

Whether it is the sterilization of the water-supply for the largest city in the country, or for a small construction camp on a country job, a proper size chlorine control machine for sterilizing drinking water will be found described in the literature of Wallace & Tiernan Co., Inc., Newark, N. J.

**PAVING ASPHALT THAT WITHSTANDS WEAR**

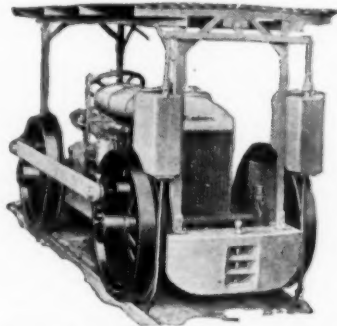
The latest method of constructing and maintaining asphalt pavements and the proper uses of Stanolind paving asphalt are found in a booklet which may be secured from the Standard Oil Co. of Indiana, 904 S. Michigan Ave., Chicago, Ill., by writing on your business letterhead or official stationery.

## Tractors Quickly Converted into Industrial Locomotives

Contractors Find This Extends the Use of Tractors and Provides Reliable Locomotives

**A**N attachment for a Fordson tractor which can be quickly applied, making it possible to run the tractor on rails for use in quarries, brickyards and sawmills and for industrial work in road construction, has been placed on the market by the Adamson Motor Company, Birmingham, Ala. The entire shift from tractor to industrial locomotive or vice versa can be made in three hours without impairing the tractor in any way. All the parts are built standard, the different gages being accommodated in the changes of the wheels. When the gage is above 29 inches, the four wheels are 33 inches in diameter; when the gage is under 30 inches, the rear wheels are 36 inches in diameter and the front wheels 18 inches in diameter with a 4-inch tread. The wheel-base for the wider gages is 74 inches, and for smaller gages, 57 inches.

The attachment when on the tractor places the motor 4 feet above the top of the rails and makes it about 10 feet long with the bumpers. It is rigged for carrying sand, the pockets for which are swung on the top posts, giving sand on all four wheels when running forward. The approximate hauling capacities of this outfit on suitable rails, allowing 15 pounds per ton friction on 30 gage and over, amounts to about 35 tons on the level to 3.4



NEW ATTACHMENT ON FORDSON TRACTOR EXTENDS ITS SERVICE

tons on a 5 per cent grade in high gear, and 158 tons on the level in low gear to about 16 tons on a 5 per cent grade, with the standard gear. With fast gear in high, it can haul on the level 22 tons and 2 tons on a 5 per cent grade, while in low it can handle 100 tons on the level and about 10 tons on a 5 per cent grade.

## New Concrete Mixer Model

**T**HE Jaeger Machine Company, Columbus, Ohio, has announced that it has added a new model mixer, 14-L, with a capacity of 14 cubic feet of mixed concrete per batch to its line. The mixer drum is the standard Jaeger tilting type, 52 inches in diameter and 44 inches deep. It is equipped with a 4-cylinder, 15-horse-power automobile type engine, and has a loader bucket which is lifted to the unloading position by a quick-acting clutch. The mixer is also equipped with an automatic water-tank.

This new mixer has also been built into a paver known as Model No. 14-P. This new and larger paver has many of the same con-

struction features as the No. 7 paver. A complete Fordson 4-cylinder engine with differential gear has been adopted as the power unit for this machine. The concrete is distributed by a specially designed boom and bucket. It is a bottom-dump bucket with pivot on one side. Through this arrangement the operator can spread the batch as it is being dumped, so that little additional spreading is required. The 14-P is a 3-bag paver using the proportions of 1:2:4, making at least 14 cubic feet of mixed concrete. Traction for this paver is forward or back and is easily controlled by the operator.

## New Model of Creeper Truck Loader

**A** NEW model of the Haiss creeper truck loader with improvements and refinements has been announced by the George Haiss Manufacturing Company, Inc., 143rd Street and River Avenue, New York City. It is claimed that this machine is more easily operated and has greater strength and capacity and lower up-keep expense than earlier models. It has two regular Haiss steel plate feeding

propellers, 2-inch crowding toothed buckets, and enclosed transmission and clutches.

The operation record of one of the new models shows that it consistently loaded 6 yards of 2-inch gravel in 3 minutes and got out 41 such loads, or 246 yards, on 8 gallons of gasoline. A 37-horse-power Waukesha truck motor operates this loader, which weighs 14,000 pounds.



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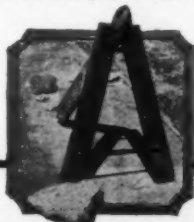
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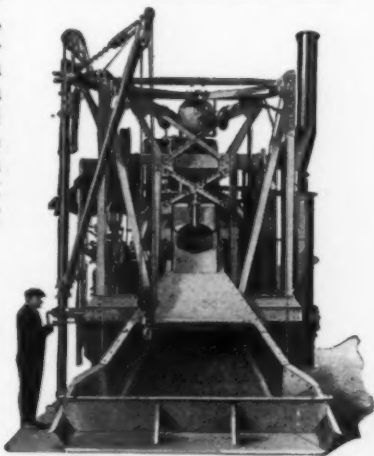
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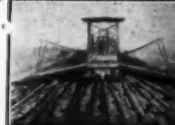
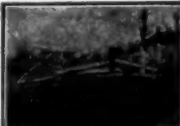
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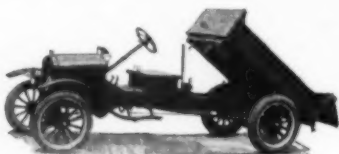
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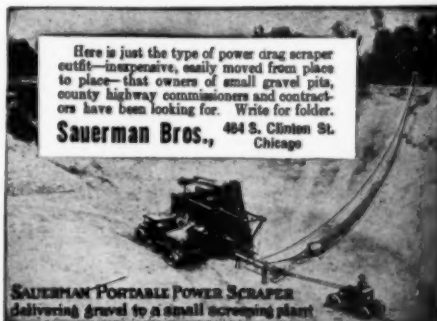
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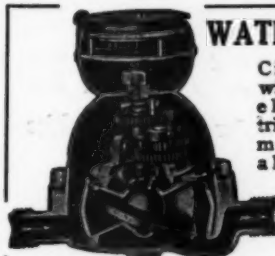
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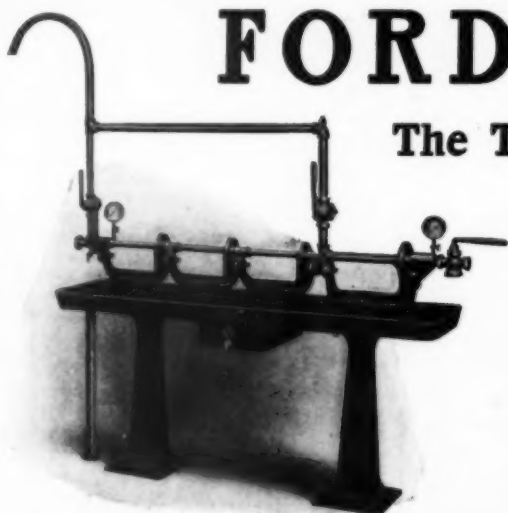
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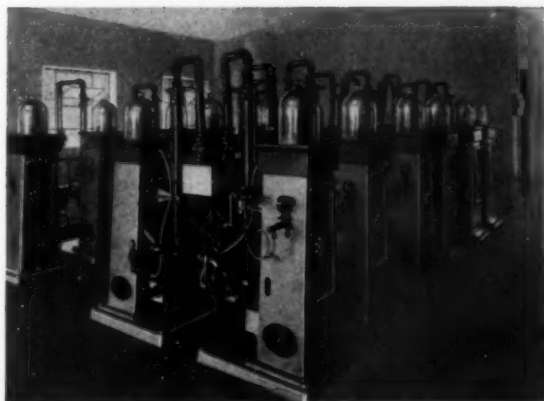
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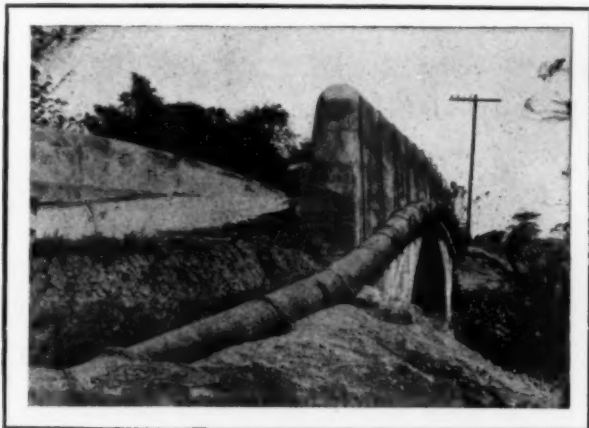
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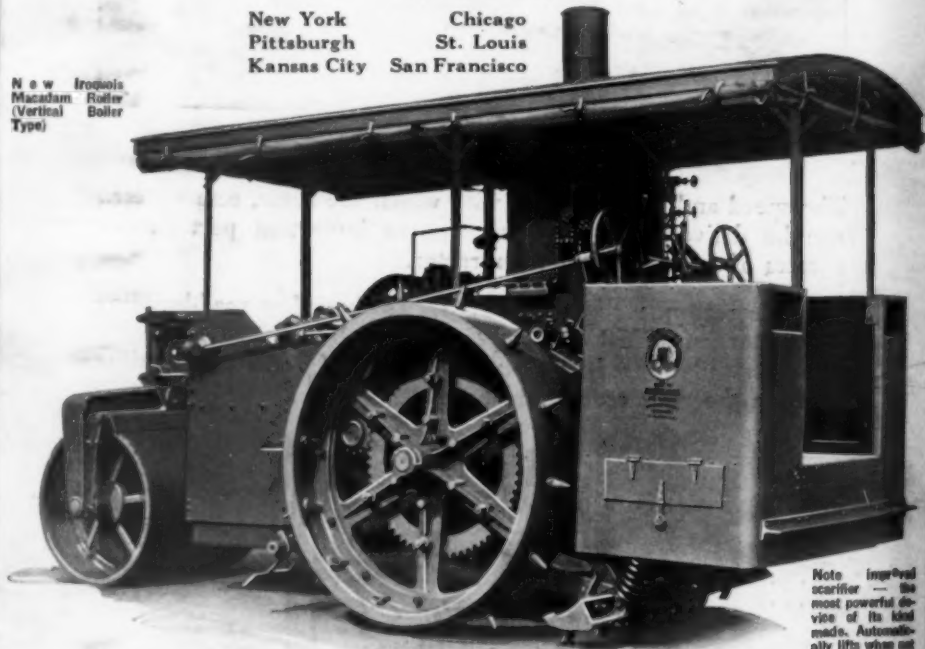
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